



GUJARAT STATE DISASTER MANAGEMENT AUTHORITY (GSDMA)

## Draft Environment and Social Management Framework

### *National Cyclone Risk Mitigation Project-II*



## Abbreviations

APL	Adaptable Programme Loan
APMC	Agriculture Produce Market Committee
BISAG	Bhaskaracharya Institute of Space Application and Geo-Informatics, Gandhinagar
BNHS	Bombay natural History Society
BP	Bank Procedures
BT	Black Top
CRZ	Coastal Regulation Zone
CSMMC	Cyclone Shelter Management and Maintenance Committee
CVCA	Critically Vulnerable Coastal Areas
CZMA	Coastal Zone Management Authority
CZMP	Coastal Zone Management Plans
DPO	District Project Coordinator
EA	Environment Assessment
EAC	Expert Appraisal Committee
EC	Environmental Clearance
EIA	Environmental Impact Assessment
EMP	Environment Management Plan
EPA	The Environment (Protection) Act
ESS	Environment and Social Standards
FCA	Forest (Conservation) Act, 1980
GCZMA	Gujarat Coastal Zone Management Authority
GEC	Gujarat Ecology Commission
Gol	Government of India
GPCB	Gujarat Pollution Control Board
GS	Gram Sabha
GSDMA	Gujarat State Disaster Management Authority
GSDP	Gujarat's State Domestic Product
GVA	Gross Value Added
HRVA	Hazard Risk and Vulnerability Atlas
HTL	High Tide Line
IBA	Important Bird Area
IDA	International Development Association
IMD	Indian Metrological Department
LTL	Low Tide Line
MoEFCC	Ministry of Environment and Climate Change
NH	National Highways
NCRMP	National Cyclone Risk Mitigation Project
NDMA	National Disaster Management Authority
OP	Operational Policies
PAP	Project Affected Persons
PGA	Peak Ground Acceleration
PMSC	Project Management Consultancy Service
SAC, ISRO	Space Application Centre, Indian Space Research Organization, Ahmedabad
SEAC	State Expert Appraisal Committee
SH	State Highway
TOR	Terms of Reference
UTs	Union Territories
UNDP	United Nation Development Program
WB	World Bank

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# Chapter-1: Brief about National Cyclone Risk Mitigation Project

## 1.1 PROJECT PREMISE

India has a coastline of about 7,516 km, 5,400 km along the mainland, 132 km in Lakshadweep and 1,900 km in the Andaman and Nicobar Islands. Although the North Indian Ocean Basin (including the Indian coast) generates only about 7% of the world's cyclones, their impact is comparatively high and devastating, especially when they strike the coasts bordering the North Bay of Bengal.

There are 13 coastal states and Union Territories (UTs) in the country, encompassing 84 coastal districts which are affected by tropical cyclones. Four states (Tamil Nadu, Andhra Pradesh, Orissa and West Bengal) and one UT (Puducherry) on the east coast and one state (Gujarat) on the west coast are highly vulnerable to cyclone disasters.

Cyclones are characterized by their destructive potential to damage structures such as houses, lifeline infrastructure such as power and communication towers, hospitals, food storage facilities, roads, bridges, culverts, crops, etc., due to high velocity winds. Exceptionally heavy rainfall causes flooding. Storm surge inundates low-lying areas in the coastal areas resulting in loss of life and destruction of property, besides eroding beaches and embankments, destroying vegetation and reducing soil fertility. Frequent natural disasters that occur in various parts of country cause large scale loss of life and property. These natural disasters also adversely impact the development and economy of the region.

It has been observed that between 1891 and 2006, 308 cyclones crossed the east coast, out of which 103 were severe. Less cyclonic activity was observed on the west coast during the same period, with 48 cyclones crossing the west coast, out of which 24 were of severe intensity<sup>1</sup>.

Although it is not possible to completely avoid natural disasters, their effects can be minimised by taking some known long- and short- term structural and non-structural mitigation measures such as developing proper early warning systems, creating awareness at all levels in the concerned communities, coastal afforestation, construction of shelters, embankments, dykes, coastal roads, bridges, canals, etc., through better preparedness, mitigation measures and improved response mechanisms.

The Indian coastline which is about 5700 kms long has been highly vulnerable to natural disasters on account of its unique geo climatic conditions. Tropical Cyclones have been recurrent phenomena resulting in huge loss of life and properties.



Figure 1 Map representing Cyclone Prone States of India

<sup>1</sup> Reference: <http://www.ndma.gov.in/images/guidelines/cyclones.pdf>

## 1.2 THE PROJECT – NCRMP

The Ministry of Home Affairs, Government of India drew up the National Cyclone Risk Mitigation Project (NCRMP) with a view to reducing the vulnerability of the coastal areas to cyclones. This project was later transferred to the National Disaster Management Authority (NDMA) constituted under the provisions of the Disaster Management Act, 2005. NDMA is implementing the Project in coordination with participating State Governments and the National Institute for Disaster Management (NIDM) with World Bank (WB) assistance.

The overall objective of the Project is to undertake suitable structural and non-structural measures to mitigate the effects of cyclones in the coastal states and UT's of India.

The Project has identified 13 cyclones prone States and Union Territories (UTs), with varying levels of vulnerability. These States/UT have further been classified into two categories, based on the frequency of occurrence of cyclone, size of population and the existing institutional mechanism for disaster management. These categories are:

- **Category I:** Higher vulnerability States i.e. Andhra Pradesh, Gujarat, Odisha, Tamil Nadu and West Bengal.
- **Category II:** Lower vulnerability States i.e. Maharashtra, Karnataka, Kerala, Goa, Pondicherry, Lakshadweep, Daman and Diu, Andaman and Nicobar Islands.

## 1.3 PROJECT OBJECTIVES:

The National Cyclone Risk Mitigation Project seeks to minimize vulnerability in the cyclone hazard prone states and UTs of India and make people and infrastructure disaster resilient, in harmony with conservation of coastal ecosystem. The project seeks to achieve its objectives by undertaking the following structural and non-structural measures:

- 1) Early warning and communication system by improving the last mile connectivity.
- 2) Creation of risk mitigation infrastructure. This includes construction and sustainable maintenance of Multi-purpose Cyclone Shelters (MPCSs); improved access and evacuation to these and already existing MPCSs and habitations through construction of roads and bridges, and; strengthening/repair of coastal existing embankments at selected places for protection against storms, flooding and storm surge in high risk areas.
- 3) Enhanced capacity and capability of local communities to respond to disasters and;
- 4) Strengthening Disaster Risk Mitigation (DRM) capacity at Central, State and Local levels in order to enable mainstreaming of risk mitigation measures into the overall development agenda.

## 1.4 THE FINANCING AND PROJECT AGREEMENTS:

Project Agreement relating to NCRMP were signed between the Department of Economic Affairs, WB and the State Governments of Andhra Pradesh and Odisha on 14.1.2011. The Project completion date of Phase-I is 31st March 2018. NDMA in co-ordination with the Govt. of Andhra Pradesh and Odisha and NIDM as a Centrally Sponsored Scheme at the cost of Rs. 2541.60 crore. The project was funded by the World Bank as an Adaptable Programme Loan (APL) with an International Development Association (IDA) credit amounting to Rs. 1985.68 crore. The remaining amount of Rs. 555.91 crore was to be contributed by Governments of Andhra Pradesh and Orissa (Under Component B only that included Cyclone risk mitigation Infrastructure).

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## 1.5 NCRMP (ADDITIONAL FINANCING:

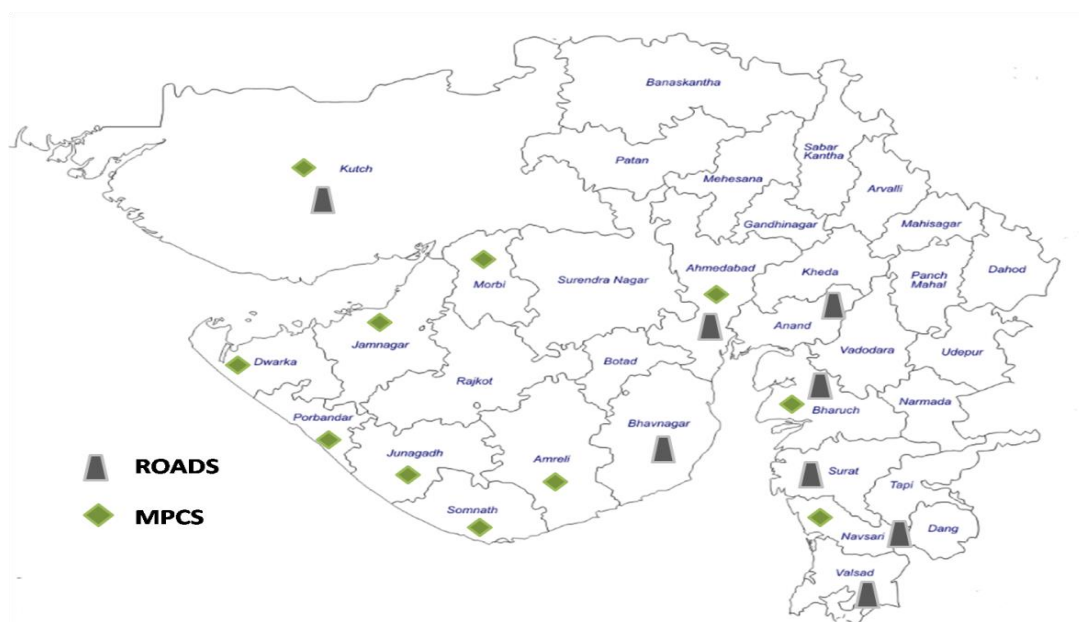
Additional financing proposal was formulated to fill up the infrastructural gaps observed during cyclone Phailin by creating additional infrastructure. The total Outlay under Additional Financing is Rs 835Cr which includes Rs 645.79Cr credit from the WB and 25% contribution by State Governments totalling Rs 189.21Cr under Component-B on the same lines as in the NCRMP Ph-I. Government of India approved Additional Financing in July, 2015 for the States of Andhra Pradesh and Odisha.

## 1.6 NCRMP PHASE-II:

Government of India has approved Phase-II in July, 2015 for five years up to March, 2020 covering States of Goa, Gujarat, Karnataka, Kerala, Maharashtra and West Bengal at an Outlay of Rs 2361.35Cr with the World Bank funding amounting to Rs1881.20Cr. The remaining amount of Rs 480.15Cr. is being contributed by State Governments as their share. The sub-component of underground cabling has been included under NCRMP Phase-II. (Under Component-B Cyclone Risk Mitigation Infrastructure).

## 1.7 NCRMP- GUJARAT SUB-PROJECT:

Gujarat, situated in the western India, has a coast line of over 1600 km (30% of the coast line of mainland India). Owing to its geo-climatic, geological and physical features, Gujarat is vulnerable to all-major natural hazards (Drought, Flood, Cyclone, Earthquake, Tsunami etc.). The State is also under constant threat of industrial (chemical) disasters as 35% of the total Major Accident Hazard (MAH) units of the country are located mostly at Vapi, Hazira, Ankleshwar, Dahej, etc. In addition, the state is prone to occurrence of biological disasters and other technological/human caused hazards such as transportation accidents, terror attacks, radiological accident etc.



**Figure 2** Map indicating the location of MPCs and Road Works

## 1.8 PROJECT COMPONENT - GUJARAT SUB-PROJECT:

The NCRMP II provides for development of infrastructure for Gujarat that would provide succour to the people of the region at times of distress. While the Indian Metrological Department (IMD) has developed systems to forecast (IMD) climatological disasters like high rain, cloud burst, cyclone, drought, etc. It is important that the available information reaches to all the people on risk in real time due to impending natural hazard event. It helps the people on risk to be prepared. The early warning system is proposed to reach information to far flung areas that are at risk. The project includes infrastructure for providing shelter to people who may be rendered homeless as their homes have been rendered unusable/unsafe due to cyclone and floods or other natural disasters. The approach roads in the region shall provide for connectivity at times of distress. It is important that the communication is available for the affected area to provide for supplies of food medicine and other essentials and evacuation if needed. The Gujarat sub-component of the project includes provisions as detailed in Table -1. 1.

**Table – 1.1 Gujarat Sub-project provisions in the NCRMP II**

Sr No.	Infrastructure	Physical	Financial (Rs Crore)	Remarks
Component A: Early warning dissemination system				
1. Early warning dissemination system		20.50	100% Government of India	
Component B : Cyclone Risk Mitigation Infrastructure				
1. Cyclone shelters (No.)	100	305.00	75% Government of India & 25% Government of Gujarat	
2. Roads (km)	43	165.00		
3. Under ground Cabling (km)	20LT 45HT	100.00		
Component C :Technical Assistance <sup>2</sup>				
Capacity Building and Knowledge Creation.				
Component D: Project Management and implementation Support				
1. Project Management and Implementation Support		28.00	100% Government of India	
Total		618.50		

## 1.9 NEED OF ENVIRONMENTAL AND SOCIAL MANAGEMENT:

The primary objective of the NCRMP is minimizing disaster risks through selected structural and non-structural project interventions. Any civil work, if carried out without adequate planning and diligence is likely to cause unwarranted/adverse impacts on environment and people/communities and thereby affect the intended project development outcomes and sustainability of the investment. The environmental and social impacts need to be carefully assessed and managed especially when works are proposed in the areas that have high population density and sensitive or ecologically important features, such as that in the coastal realms of India.

It is therefore, necessary that the dispersed sites for project infrastructure are carefully examined for their impact on environment and local community. It is also equally important that necessary mitigation measures are taken, if required, to minimize any environment impact and to ensure their utility and acceptability by the community. It

<sup>2</sup> **Component C** is Technical Assistance for Cyclone Hazard Risk Mitigation, Capacity Building and Knowledge Creation. The National Disaster management Authority is implementing it

may also be relevant to have action plan and monitoring mechanism to ensure that execution of works does not cause any adverse impact on environment locally and at source of materials. Equally important is to ensure that local people are protected from any inconvenience or social disturbance and the workers welfare is ensured according to established norms.

The NDMA accordingly prepared a document to serve as a 'guide' for the planning, design and construction of project interventions/sub-projects and help in harmonizing the principles/approaches for project preparation and execution. In this context, a Framework approach has been adopted and an Environment and Social Management Framework has been prepared for the project.

#### **1.10 PROJECT MANAGEMENT IN GUJARAT:**

Gujarat State Disaster Management Authority (GSDMA) has mandate to prepare programmes and plans to mitigate the losses on account of disasters as a strategy for long terms disaster preparedness in Gujarat. Accordingly GSDMA is tasked to implement the NCRMP Gujarat component. GSDMA engaged KPMG Advisory Services Private Limited for Project Management Consultancy Service (PMSC). The role of PMSC included Environmental and Social Screening of dispersed MPCS and road sites, advice on CRZ and other regulatory clearances, providing inputs for Environment Management Plan (EMP), monitoring of EMP, supervising EIA for the underground cabling component apart from other management functions for the project. This report covers environment and social screening aspects of MPCS and roads. The underground cabling component impacts significantly large population and has implication for large land area. Estimated cost of the Gandhidham Adipur in Kutch District Underground cabling is Rs. 160 crore. as also financial inputs. It therefore, required separate Environment Impact Assessment (EIA) study by a separate agency.

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## Chapter 2: Brief about Project Area -Gujarat under NCRMP-II

### 2.1 INTRODUCTION

Gujarat is positioned between 20° 6' N to 24° 42' N latitude and 68° 10' E to 74° 28' E longitude. The westernmost state of India, Gujarat is bordered by Pakistan and Rajasthan state in the north east, Madhya Pradesh in the east, and Maharashtra and the Union Territories of Daman, Diu, Dadra and Nagar Haveli in the south. The geographical area of the Gujarat state (India) is 19.60 million ha and the reporting area is 18.82 million hectare. The forest area of the state is 1.88 million ha. The barren and uncultivated land is 2.61 million ha. The proportion of cultivable waste in Gujarat is 2.32 million ha.

### 2.2 TOPOGRAPHY

Topography divides naturally into two principal regions;

- (i) Main land Gujarat in the east; and
- (ii) The Saurashtra & Kutch peninsula in the west.

Mainland Gujarat consists of alluvial plains (Sabarmati, Mahi, Narmada, Tapti being major river systems) and its eastern border is formed of hilly ranges with altitude 300m to 1000m. Saurashtra Peninsula is a hilly tract with low mountains of 300-600 meter. It is bordered by the coastal plains. Kutch region is rocky and barren and is composed of the Ranns, the Banni plains, the hilly region with the island belt of four rocky projections. The rivers Banas, Sabarmati, Mahi, Narmada, and Tapi are the major rivers flowing through Gujarat plain which drain into the Gulf of Khambatt. While the rivers Ojat, Bhadar, and Shetrunji are the major rivers of Kathiawar peninsula which drain into the Arabian Sea. Apart from these there are few seasonal and small rivers that drain into the Gulf of Kachchh<sup>3</sup>.

### 2.3 LAND USE PATTERN

The reporting area of Gujarat for land utilisation is 1,89,333 km<sup>2</sup> which is 96.6 percent of the total geographical area (1,96,024 km<sup>2</sup>). The net sown area accounts for 1,03,020 km<sup>2</sup> (54%) of reporting area. Table – 2.1 show the various land use classifications.

Table – 2.1: Land Use classifications for Gujarat, 2009 -10

Land use classification	Area in km <sup>2</sup>	Percentage
Net sown	103020	54.7
Current fallow	3790	2.01
Fallow other than current fallow	160	0.08
Forests	19130	10.1
Land under tree crops	40	0.02
Cultural wasteland	19790	10.5
Permanent pastures	6900	3.64
Land not available for cultivation	35280	18.63

<sup>3</sup> Ref: Read more at <http://www.iloveindia.com/states/gujarat/weather.html#EljBwb6B5fCGVTp9.99>  
<http://www.iloveindia.com/states/gujarat/weather.html>

## 2.4 ECONOMIC PROFILE

Gujarat's State Domestic Product (GSDP) had been rising at an average growth rate of 10.1% since 2005 to 2013; this is more than the national average. It contributes more than 7.5% to India's GDP. 28% of GSDP contribution comes from manufacturing sector and as Gujarat accounts more than 10% factories in India. Its key industry sectors are textile, engineering, chemicals, petrochemicals, drugs and pharmaceuticals, dairy, cement and ceramics, gems and jewellery, etc. Total crop area is more than one half of the total land area. Gujarat produces cotton, groundnuts, dates, sugarcane, milk and milk products.

## 2.5 AGRICULTURE

The main food crops are bajra, jowar, rice and wheat. Major commercial crops or cash crops are groundnut, tobacco and cotton, linseed, sugarcane, etc. Other important cash crops are isabgul (Psyllium husk), cumin, mangoes and bananas. Groundnuts cover the maximum sown area among all crops. Cotton stands second.

Animal husbandry and dairying have played a vital role in the rural economy of Gujarat. Dairy farming, primarily concerned with milk production, functions on a cooperative basis and has more than a million members. Gujarat is the largest processor of milk in India. Amul Milk Co-operative Federation products are well known all over India and are Asia's biggest dairy. As per the results of livestock census 1997, there were 209.70 lakh livestock in Gujarat state. As per the estimates of the survey of major livestock products, during the year 2002–03 the Gujarat produced 6.09 million ton of milk, 385 million eggs and 2.71 million kg of wool.

## 2.6 CO-OPERATIVE MOVEMENT IN GUJARAT

Gujarat is better known for its milk cooperative societies on Amul Pattern. In Gujarat there are 13 District Milk Unions and 12402 Primary Milk Co-operatives and milk procurement is average 6.7 million kg per day. The total business in milk cooperative sector is estimated in excess of Rs. 4000 crores per annum.

In Gujarat State, there are 207 Agriculture Produce Market Committee (APMC) There are 207 APMC and approximately more than Rs.16989.97 Crores Agricultural Products are sold through APMCs per annum.

Three tier Co-operative Credit structure has helped the farmers to get Agriculture credit. There are 7943 Primary Agricultural Credit Co-operative Societies in the State, functioning in rural areas. Total finance for agriculture through Co-operative Sector is more than Rs. 3500 Crores.

There are 260 Urban Co-operatives Banks in the State having 621 branches and 26.09 lacs membership. The total deposits of the banks amount to Rs.16,156 crores and advances are Rs.10,436 crores<sup>4</sup>.

## 2.7 INDUSTRIES

One of India's most industrialized states, Gujarat maintains a variety of industries, the principal ones being general and electrical engineering and the manufacture of textiles, vegetable oils, chemicals, soda ash, and cement. New industries include the production of fertilizers and petrochemicals. Major resources produced by the state include cotton, peanuts, dates, sugarcane, and petrol. The state is rich in calcite, gypsum, manganese, lignite, bauxite, limestone, agate, feldspar and quartz sand and successful mining of these minerals is done in their specified areas. Gujarat produces about 91% of India's required amount of soda ash and gives the country about 66% of its national requirement of salt. Chemical Industries in Gujarat count for more than 35% of Indian Chemicals production. Ahmedabad, Ankleshwar and Vapi are the hub of chemical industries in the state, having number of manufacturing units (private as well as state owned) manufacturing dyes, specialty chemicals, agricultural chemicals, pesticides, pigments, colors, etc. Rajkot city is

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<sup>4</sup> Ref: <http://dhananjaycoop.blogspot.in/2010/04/questionnaire-on-cooperative-movement.html>

the hub of engineering manufacturing and has many companies manufacturing auto components, auto engines, CNC machines, forging & casting parts, etc.

## **2.8 PEOPLE**

According to 2011 census the population of Gujarat State was 6.04 crore. The population density is 308 km<sup>-2</sup> lower than other Indian states. As per the census of 2011, the state has a sex ratio of 918 girls for every 1000 boys, one of the lowest (ranked 24) amongst the 29 states in India. Rural population of the state is 57.4%. Literacy rate in Gujarat is 78.03% as per 2011 population census. As per Census 2011, the population of Scheduled Castes and Scheduled Tribes in the state is 40.74 lakh (6.7 %) and 89.17 lakh (14.8 %) respectively.

## **2.9 CULTURE**

Gujarat is a melting pot of varied cultures, traditions and religions. Gujarat's long coastline had attracted sea-farers through the ages, lured by the rich prospects of trade. The Arabs, Portuguese, Dutch, Mughals, British and Parsis have also left their marks on Gujarat's culture. Gujarati people celebrate all regional and national fairs and festivals with equal fervor. Gujarat's vibrant culture is also evident in the various dance forms, music, art and crafts and cuisine.

## **Chapter 3: Environmental features of the study area**

### **3.1 CLIMATE**

The state is bounded by the Arabian Sea in the west and the southwest. The climate in Gujarat is moist in the southern areas while dry in the northern region. The Tropic of Cancer passes through the northern border of Gujarat, resulting in an intensely hot or cold climate in Gujarat. But the Arabian Sea bordering the state and the Gulf of Cambay in the west and the wooded hills in the east reduce the climatic extremes and make the climate more pleasant and salubrious.

There is great diversity in the climate of Gujarat India. Gujarat experiences mild, pleasant and dry winters, with average daytime temperatures ranging around 29°C and night temperatures around 12°C. The summers are very hot and dry, with day temperatures rising up to around 41°C and night temperatures dropping to 29°C.

In Gujarat, a year can be roughly divided into the winter season (November to February), summer season (March to May), southwest monsoon season (June to September), and the intervening month of October.

Gujarat experiences an average rainfall of around 33 cm to 152 cm. The southern parts of the state receive average rainfall hovering between 76 cm and 152 cm, the Dangs district having the highest average of around 190 cm. In the northern parts of Gujarat, average rainfall ranges between 51 cm to 102 cm. The southern highland of Saurashtra and the Gulf of Cambay receives about 63 cm of rainfall, while other parts of Saurashtra receive rainfall less than 63 cm. The semi-desert Kutch area in Gujarat experiences a very low average rainfall. Some areas in Ahmedabad, Mehsana, Banaskantha, Panchmahals, Surendranagar, Jamnagar and Kutch districts face chronic shortage of water because of inadequate rains. These factors account for the wide diversity in the climate of Gujarat<sup>5</sup>.

### **3.2 SOILS**

The state is endowed with a wide range of macro and microclimates, physiography, landforms, geology and vegetation that have an influence on the genesis of soil.

The soils of Gujarat are broadly classified into nine major groups with Black Soil as the most dominant soil type of Gujarat. Three major variations recorded are:

- Shallow black soils
- Medium black soils
- Deep black soils

**Other categories of soil types are**

- Mixed red and black soils
- Lateritic soil
- Alluvial soils
- Alluvial sandy to sandy loam soils
- Alluvial sandy loam to sandy clay loam
- Coastal alluvial soils
- Hill soils
- Desert soils

### **3.3 AGRO CLIMATE**

Agro climate of the state divided in to eight sub regions in respect of rainfall, temperature, humidity and geographical situation.

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<sup>5</sup> Reference: <https://www.indianholiday.com/gujarat/climate-in-gujarat.html>

**Table 3.1 Agro-climatic regions of Gujarat**

Sub Region	District	Rainfall (mm)	Types of Soil
Southern Hills	Dang, Valsad, Navsari	1500 and above	Deep black with patches of costal alkali Lateritic and medium black soil
South Gujarat	Surat, Bhrauch, Narmada	1000 to 1500	Deep black clayey soils
Middle Gujarat	Panchmahal, Dahod, Vadodara, Kheda, Anand	800 to 1000	Deep black to loamy sand (Goradu)
North Gujarat	Ahemdabad, Gandhinagar, Sabarkantha, Bansantha, Patan, Mehsana	625 to 875	Sandy loam to sandy soils
North Arid Zone	Kutch	250 to 500	Sandy and saline soils
North Saurashtra	Bhavnagar, Jamnagar, Surendranagar, Amreli, Rajkot	400 to 700	Shallow medium black
South Saurashtra	Junagadh, Porbandar	645 to 700	Shallow medium black & Calcareous soil
Bhal & Coastal Areas	Khambat, Bhal Coastal Area of Surat & Bhrauch Olpad, Vagra, Hansot, Alater, Dholka, Dhanduka, Vallbhipur, Bhavnagar & Limbadi Talukas	625 to 1000	Medium black poorly drained and saline soil

### 3.4 FORESTS

The unique features of the state are the climatic and geomorphologic conditions, viz., the largest coastline in the country, the saline deserts of Rann, grasslands, wetlands. These factors have bestowed the state with the diversity of flora and fauna.

The eight agro-climatic zones that occur in the State are reflected in the diversity of ecosystems in the state. The eastern hilly belt supports dry deciduous forests in north and moist deciduous forests in the south. The State has vast grasslands and scrub forests in Kutchh, Central Gujarat and Saurashtra regions while coastal ecosystems such as mangroves, coral reefs and sea grasses are located in western parts of the state. Further, saline deserts are located in the north while moist deciduous tropical forests are found in southern areas.

### 3.5 ECOLOGICALLY SENSITIVE AREAS

The diversity of ecosystem in Gujarat endows it with diversity of flora and fauna. There are four (4) National Parks, twenty three (23) sanctuaries and one (1) Conservation Reserve having a total area of 17099.93 km<sup>2</sup>. Though, the geographical area of Gujarat is only 5.9% of the total area of India, it contributes 11.37% (17099.93 km<sup>2</sup>) area to the total PA network (148532 km<sup>2</sup>) of the country. Important PAs and other ecological sensitive areas are as below.

### 3.6 GIR SANCTUARY AND NATIONAL PARK:

The Gir Forests- the largest compact tract of dry deciduous forests in the semi-arid western part of India is the last abode of the big and regal predator, Asiatic lion (*Panthera leo persica*). The sanctuary is internationally acclaimed for successfully saving this precious species from the brink of extinction. The forests and woodlands including coastal forests of villages in which project supported MPCs are being constructed in district Amreli, Gir Somnath and Junagadh though not too close to Gir Sanctuary and National Park yet are often frequented by Asiatic lion and leopards.



### **3.7 MARINE NATIONAL PARK & WILDLIFE SANCTUARY:**

Marine National Park (MNP) and Sanctuary, Jamnagar, was notified in August 1980. MNP and Sanctuary falls in the inter-tidal zone along the districts of Jamnagar and Dev Bhumi Dwarka coasts and islands in the Gulf of Kachchh. Blessed with a great diversity of habitats, its Coral Reefs and Mangrove vegetation and the series of 42 islands form a unique, though fragile, eco-system, which supports an amazing marine life and biodiversity. It is a treasure trove of colorful corals and sponges, giant sea anemone, jelly fish, sea horse, octopus, pearl oyster, Portuguese man of war, starfish, dolphin, shark and many more varieties of under water creatures and plants. The MNP and Marine Sanctuary is relevant to the MPCs sites of the villages in Devbhumi Dwarka and Jamnagar districts.

### **3.8 WILD ASS SANCTUARY:**

Wild Ass Sanctuary encompasses an area of 4953.70 km<sup>2</sup> of the Little Rann of Kutchh. Easily spotted in big groups in the vast span of desert throughout the year, this population of wild ass is the only gene pool of Indian Wild Ass in the entire world and one of the six geographical varieties or sub-species surviving on the earth. Owing to the uniqueness of the area and the existence of the rare and endangered species such as Dalmatian pelican, lesser flamingo, sarus crane, caracal, desert fox, black cobra etc., the area is being considered to be declared as one of the world heritage sites. Internationally the area is recognized for its natural and geomorphological value and has high biodiversity conservation significance. With the arrival of monsoon the landscape changes dramatically, when entire sanctuary area is filled with shallow fresh water. This stagnant water offers a vast feeding ground to the famous Kutchh prawns and several other birds, fish and invertebrates. It is part of the Kutchh Biosphere Reserve.

### **3.9 WETLANDS OF GUJARAT**

Gujarat contributes 23% of wetland area of the country. Space Applications Center (SAC-ISRO) has estimated total wetland area of 34,749.50 km<sup>2</sup> in Gujarat state in its "National Wetland Atlas-Gujarat" (2010). In Gujarat, the coastal and inland wetlands cover 92.3% and 7.7% of the total wetland area, respectively highlighting the importance of this ecosystem. The wetlands in the state have special international significance. The western most part of the state is recognized as the gateway of migratory waterfowl that come into the sub-continent. The wetlands of the state are major wintering areas for cranes, pelicans, terns, ducks, and shore birds (mainly waders). These birds are highly dependent on the village tanks and storage reservoirs.

Great Rann of Kachchh, Khijadiya Bird Sanctuary, Little Rann of Kachchh, Nalsarovar, Nani Kakrad (Navsari), Pariej, Thol Bird Sanctuary and Wadhvana are the eight wetlands of national importance identified by Ministry of Environment, Forest and Climate Change for implementing National Wetland Conservation Programme. According to the 2003 waterfowl census, about 8.1 lakh birds of 138 species were recorded in these wetlands. The estimation for the year 2004 showed an increase of 1.5 million birds belonging to 154 species, highlighting the conservation significance of the wetlands of the State.

### **3.10 MANGROVES**

Gujarat coasts support the second largest area of mangrove forests in India, after West Bengal, with 1107 km<sup>2</sup> of mangrove forests. Mangroves received attention and efforts to rejuvenate after declaration of Marine National Park in 1980. The mangrove cover increased from estimated 427 km<sup>2</sup> in 1987 to 1107 km<sup>2</sup> in 2015, over two and a half fold increase. Gujarat is the only state of India that has reported such significant increase in Mangrove forests. Mangroves that were once considered wastelands are being increasingly recognized for the ecological services they perform in shore stabilization, protection from cyclones/storms/tsunami, home to marine

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biodiversity, etc. Mangroves areas are relevant to the project in the districts Kutch, Jamnagar, Devbhumi Dwarka, Bhavnagar and Bharuch districts.

### **3.11 SEA TURTLE BREEDING GROUND**

The state of Gujarat on the west coast of India is believed to harbour four species of sea turtles, including the olive ridley (*Lepidochelys olivacea*), green turtle (*Chelonia mydas*), leatherback turtle (*Dermochelys coriacea*) and hawksbill turtle (*Eretmochelys imbricata*). However, only olive ridley and green turtles breed along the Gujarat coast (Bhaskar, 1978; Kar & Bhaskar, 1982; Bhaskar 1984); the other two species have been occasionally sighted by local fishermen<sup>6</sup>.

A study by the Gujarat Ecology Commission (GEC) identified 28 stretches of beach in four districts, viz., Kutch, Jamnagar, Porbandar, Junagadh where significant nesting activity of sea turtle is observed. The sea turtle breeding sites are relevant to the project in the districts Kutch, Jamnagar, Devbhumi Dwarka, Porbandar and Junagadh districts.

### **3.12 GUJARAT COAST**

The State has the largest share (1,600km, 23%) of the total Indian coastline. Significant features of Gujarat coast are:

- Its coast has a high diversity of terrain, shelf depths and hydrology, with some extremely flat and low lying sections.
- There are two major gulfs, viz., Gulf of Khambhat and Gulf of Kutch. The highest tidal ranges in the Indian coast are witnessed in the Gulf of Khambhat (up to 8m). These characteristics can amplify storm surges and impact wide stretches unlike many other coastal regions of India.
- The state has a large number of key ports and coastal settlements and it serves as gateway for importing petroleum, gas and other bulk goods to North India.
- About 10 million people (about 25 per cent of the State population) live in coastal talukas of Gujarat and this includes 75 coastal towns and 41 ports (1 major, 11 intermediate and 29 minor).
- The coast is dotted with Mangrove forests, sandy beaches, salt pans, sea turtle breeding ground, corals, home to large variety and large number of migratory and local birds, MNP and Marine Sanctuary. This natural heritage is conserved in midst of heightened economic activity with large number of ports and industries.
- Gujarat's coastal population is growing at a faster rate than the rest of the State due to rapid growth of ports, energy infrastructure and salt pans. Due to economic opportunities, growing coastal population faces increasing risk unless an appropriate techno-legal regime and appropriate zoning regulations are enforced.
- This natural heritage along the coast is conserved in midst of heightened economic activity with large number of ports and industries.

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<sup>6</sup> Ref: <https://www.iotn.org/iotn03-02-status-report-on-the-unep-cms-sea-turtle-project-on-the-gujarat-coast-india/> & Ref: <http://gujenvs.nic.in/PDF/evaturtle.pdf>

## **Chapter -4. Natural disaster vulnerability –Gujarat**

### **4.1 NATURAL DISASTER VULNERABILITY**

GSDMA has prepared a detailed taluka level Hazard Risk and Vulnerability Atlas (HRVA) for six major hazards including natural disasters tsunami, cyclone, storm surge, flood, earth quake and draught. The average annual loss of life in Gujarat due to various disasters is estimated 2000. It is estimated that 33% out of it is due to cyclone and surges. Wind damage to horticulture has been severe especially in Kutch where it is an important economic activity. Storm surge induced soil salinization and in extreme cases, sand casting is an important associated risk. This has severe long-term impacts, which can take many years to recover, especially if a cyclone event is followed by drought, in which there is a lack of run off to wash off the excess salt.

### **4.2 CYCLONE**

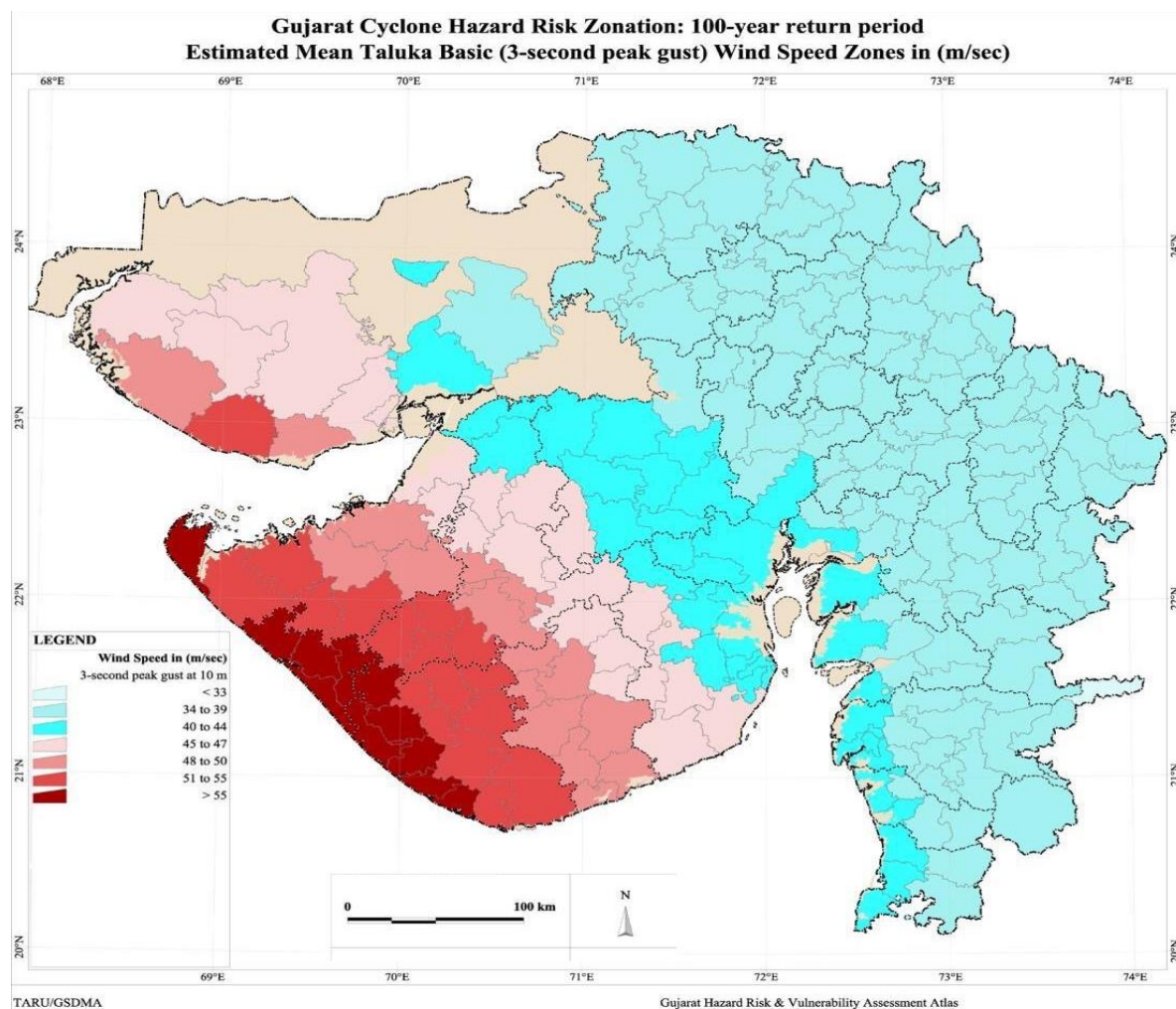
As stated, Gujarat is identified as High Vulnerability State by NDMA. IMD reported on the frequency of severe cyclones. It is reported that 28 of the 48 severe cyclones that occurred during the period 1891 to 2002 on the west coast of India hit Gujarat coast. The districts that were hit by Gujarat by these 28 cyclones were Junagadh (7), Jamnagar (6), Kutch (5), Amreli(4), Bhavnagar(4), Kheda(1) and Surat (1) (IMD 2002). The HRVA includes village level study of the area vulnerable to cyclone and action plan for cyclone risk mitigation. A detailed survey of all the vulnerable villages to cyclone and storm surge along the coastal belt of the Gujarat was undertaken. The study identified 1741 coastal villages vulnerable to cyclone and storm surge to varying degrees. The composite probabilistic cyclone and storm surge risk to the Gujarat economy is estimated at Rs 11,182 crore for capital stock and Rs 1,035 crore for Gross Value Added (GVA) for a 100-year return period event.

The significant observations for the cyclone proneness of the state of Gujarat are-

- Gujarat falls in the region of tropical cyclone. It has the longest coast line of 1600 km in the country. It is highly vulnerable to associated hazards such as floods, storm surges etc.
- Most of the cyclones affecting the State are generated in the Arabian Sea. They move North-East and hit the coast particularly the Southern Kutch and Southern Saurashtra and the Western part of Gujarat.
- Two cyclonic storm seasons are experienced in Gujarat: May to June (advancing southwest monsoon) and September to November (retreating monsoon).
- The Gulf of Kutch and Gulf of Khambhat also witness surge as the funnelling effect takes place at both the places.
- The Gulf of Khambhat is most vulnerable due to recurrent cyclone strike to the southeastern coast of Saurashtra. The eastern reach of the Gulf of Kutch is the next most vulnerable region due to its low-lying flat topography and high population density.
- The HRVA prepared by GSDMA shows the Cyclone hazard zonation along with the basic wind speed at the taluka level (Figure 4.1). Over 120 cyclones originating in the Arabian Sea had passed through Gujarat over a period of 100 years.
- Figure 4.1 shows a maximum wind speed class of more than 55 m/sec along the Saurashtra coast, specifically in Porbandar, Jamnagar and Junagadh districts, which are exposed to high intensity cyclonic and storm impact. The 51 to 55 m/sec class extends further inland to cover much of Jamnagar, part of Rajkot, Junagadh and Kutch districts. The 48 to 50 m/sec class extends to most of Rajkot, part of Amreli and Jamnagar districts including Jamnagar, Rajkot cities and parts of Kutch. The 45 to 47 m/sec class covers much of Saurashtra and all of Kutch. This is followed by the 40 to 44 m/sec class that gets its swathe from Kutch through northern Saurashtra all the way to the coast of Gulf of Khambhat and southern Gujarat. The rest of the State falls into the 34 to 39 m/sec class<sup>7</sup>.

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<sup>7</sup> <http://www.ndma.gov.in/en/gujarat-sdma-office>

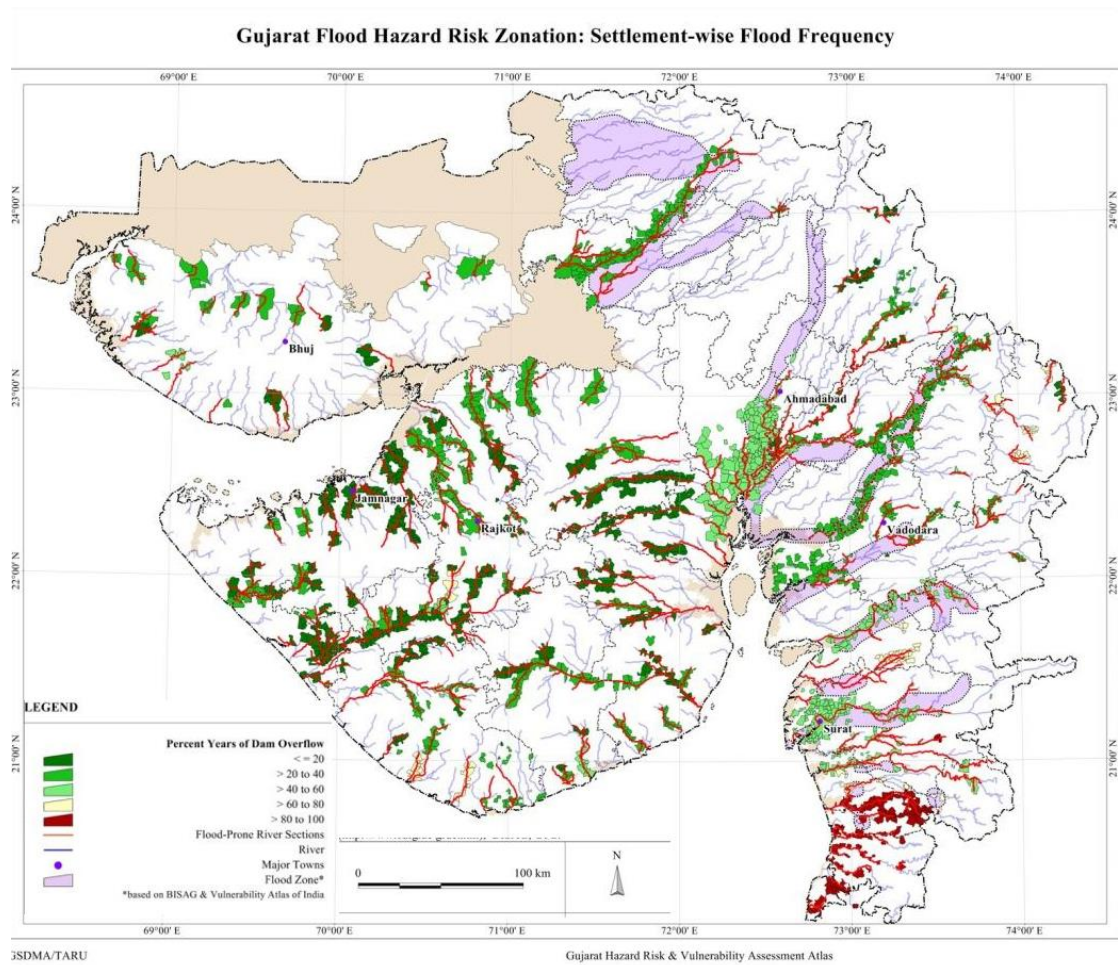


Source GSDMA

**Fig 4.1 Gujarat Risk Hazards Risk Zonation Flood**

- The climatology of Gujarat is influenced by the Arabian Sea in the West and three hill ranges along its Eastern border. A long coastline makes parts of arid Saurashtra and Kutch occasionally experience very high rainfall. These occasional heavy rainstorms are responsible for most of the floods in the State. While the Northern part of the State is mostly arid and semi-arid, the Southern part is humid to sub-humid. Extremes of climate, be it rainfall or temperatures are quite common in this region.
- All major rivers in the State pass through a wide stretch of the very flat terrain before reaching the sea. These flat lowlands of lower river basins are prone to flooding. Cities like Ahmedabad, Surat and Bharuch are located on the flat alluvial plains of large rivers.
- Concentrated runoff resulted by heavy rainfall cause flash floods in the small river basin of Saurashtra and Kutch because of their fairly impervious catchments (rocky or black cotton soils) and steep sloping upper catchments.
- Figure 4.2 shows the majority of the area of Gujarat is flood prone, irrespective of the size of the catchment.
- The flood prone river sections were identified from settlement level analysis. Flood prone river sections in Saurashtra extend to the upper basins due to the presence of dams which have to resort to emergency discharge during heavy rainstorms. Even small valleys in Saurashtra are used for agriculture. Hence flooding in these zones impacts residents, settlements and agriculture.



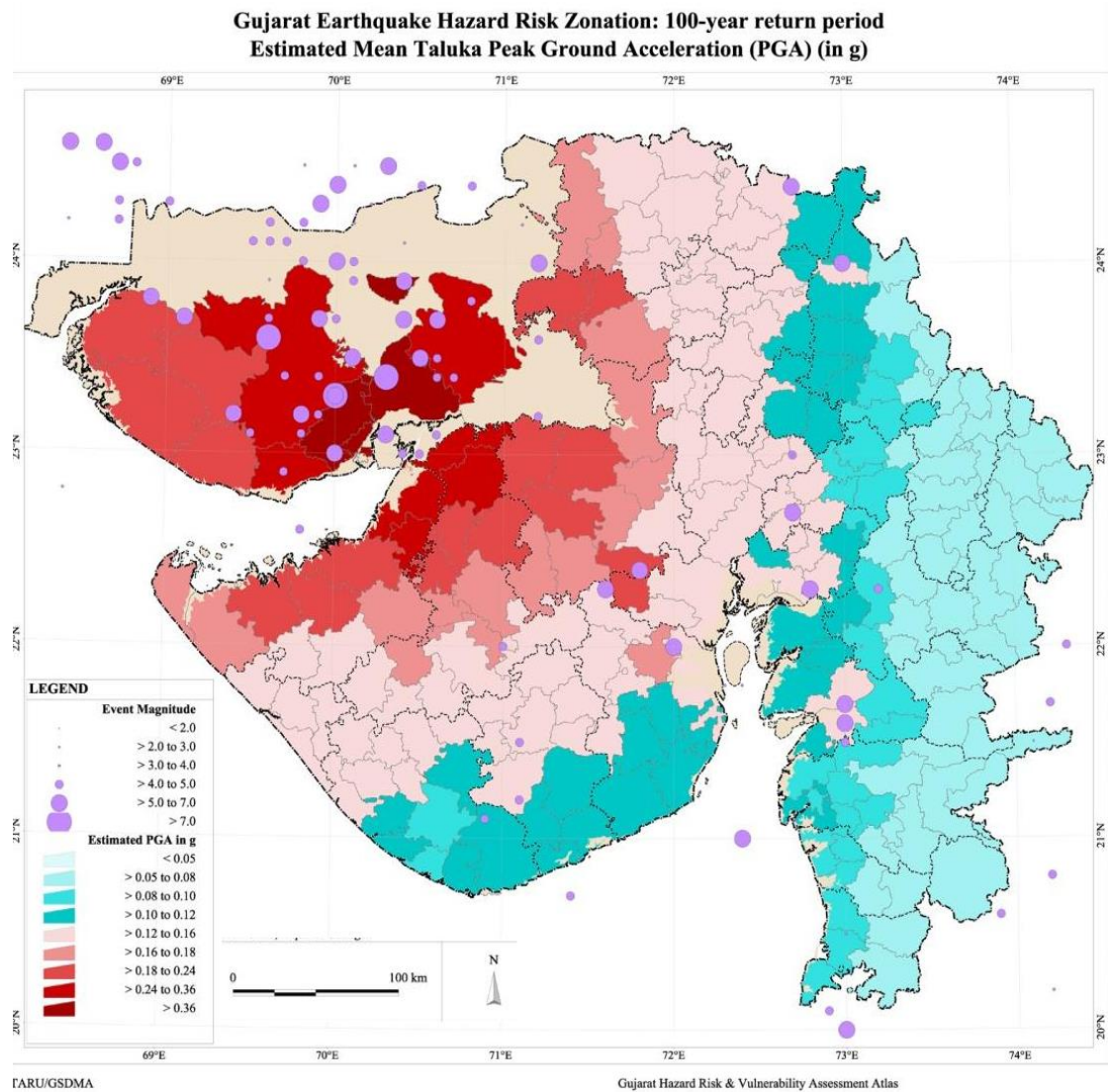


**Source GSDMA**

**Fig 4.2 Gujarat Flood Hazards Risk Zonation**

### 4.3 EARTHQUAKE

- Whole of Gujarat region has earthquake hazard of different levels from moderate to high as zones III to V are assigned to it in the seismic zoning map of India.
- In the Seismic Zoning Map of India the Gujarat region is divided into three zones. Kutch region (about 300km x 300km) is assigned zone V where earthquakes of magnitude 8 can be expected. A belt of about 60-70km width around this zone covering areas of North Saurashtra and areas bordering Eastern part of Kutch are assigned zone IV where intensity VIII can be expected mainly due to earthquakes in Kutch and some local earthquakes along North Kathiawar Fault in Northern Saurashtra. Rest of Gujarat lies in zone III where intensity VII can be expected due to moderate local earthquakes or strong Kutch earthquakes.
- The estimated mean taluka earthquake Peak Ground Acceleration (PGA) zonation for a 100-year return period is presented in the figure 4.3. All of Kutch, almost the entire coastline of northern Saurashtra that adjoins Kutch and a small area in Patan district fall into the very severe intensity zone over a 100-year return period.
- The cities of Ahmedabad, Bharuch, Rajkot, and Bhavnagar fall into the severe intensity zone, while Bhuj and Jamnagar fall in the very severe intensity zone over this time frame.

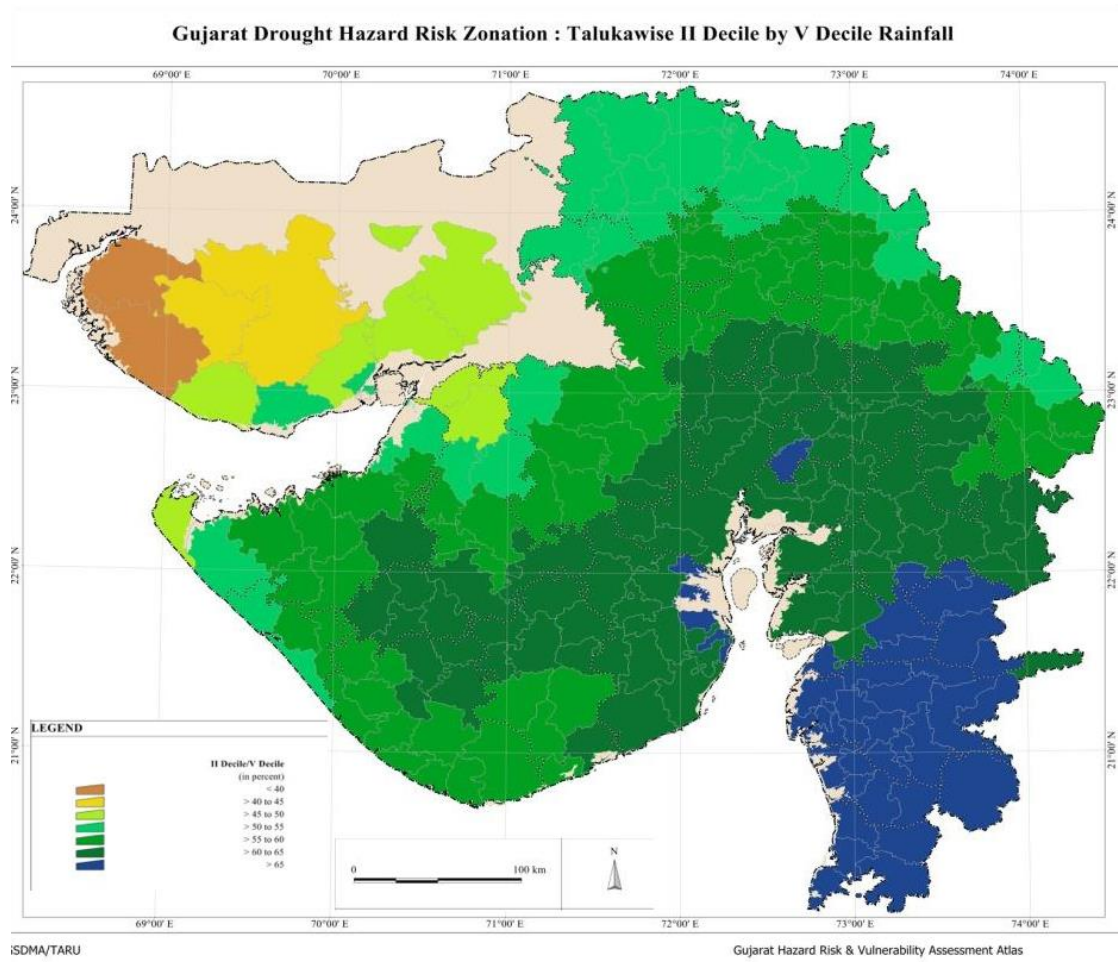


**Source GSDMA**

**Fig 4.3 Gujarat Earthquake Hazards Risk Zonation**

#### **4.4 DROUGHT**

- Gujarat is one the chronic drought prone State of India, with an average annual rainfall about only 700 mm with more than half of the Talukas of Gujarat receiving rainfall within the range of 200-400 mm.
- Substantial portions of the State are arid to semiarid. With large parts of North Gujarat and Saurashtra having no sources of alternate irrigation, drought vulnerability increasing with groundwater overexploitation. Falling water tables put added stress on crops and water supplies.



**Source GSDMA**

**Fig 4.4 Gujarat Draught Hazards Risk Zonations**



## **Chapter 5.0 ENVIRONMENTAL & SOCIAL REGULATIONS & LEGAL FRAMEWORK**

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### **5.1 ENVIRONMENTAL REGULATIONS**

Environmental and social safeguard policies of WB are cornerstone of its support to sustainable poverty reduction. The objective of these policies is to prevent and mitigate undue harm to people and their environment in the development process. WB objective is to help ensure strong protections for people and for the environment. WB helps this through policies – often called “safeguards” – that serve to identify, avoid, and minimize harms to people and the environment. These policies require borrowing governments to address certain environmental and social risks in order to receive Bank support for investment projects. There are 11 key Operational Policies (OP) and associated Bank Procedures (BP) that are critical to ensuring that potentially adverse environmental and social consequences are identified, minimized, and mitigated, and they receive particular attention during the Bank’s project preparation and approval process.

India being a welfare state is committed to the principles of environmental and social safeguards having number of provisions in the constitution for meeting the objectives of environment conservation and social safeguards. NCRMP accordingly lays emphasis on meeting Environment and Social Standards (ESS). The relevant legal provisions and WB policies are listed here.

### **5.2 ENVIRONMENTAL ASSESSMENT (OP/BP 4.01):**

The policy states that Environment Assessment (EA) and mitigation plans are required for all projects having significant adverse environmental impacts or involuntary resettlement. EA’s should include analysis of alternative designs and sites, or consideration of “no option” requiring public participation and information disclosure before the Bank approves the project. In WB operations, the purpose of EA is to improve decision making, to ensure that project options under consideration are sound and sustainable, and that potentially affected people have been properly consulted and their concerns addressed.

### **5.3 INVOLUNTARY RESETTLEMENT (OP/BP 4.12)**

Involuntary Resettlement is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts. It promotes participation of displaced people in resettlement planning and implementation, and its key economic objective is to assist displaced persons in their efforts to improve or at least restore their incomes and standards of living after displacement. The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to WB appraisal of proposed projects.

### **5.4 INDIGENOUS PEOPLES (OP/BP 4.10)**

The WB Policy on indigenous peoples, OP/BP 4.10 underscores the need for borrowers and WB staff to identify indigenous peoples, consult with them, ensure that they participate in, and benefit from WB funded operations in a culturally appropriate way – and that adverse impacts on them are avoided, or where not feasible, minimized or mitigated.

### **5.5 CULTURAL PROPERTY (OP/BP 4.11)**

The WB Policy OP / BP 4.11 defines physical cultural resources as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological,

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historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above or below ground, or under water. Their cultural interest may be at the local, provincial or national level, or within the international community. The WB assists countries to avoid or mitigate adverse impacts on physical cultural resources from development projects that it finances. The impacts on physical cultural resources resulting from project activities, including mitigating measures, may not contravene either the borrower's national legislation, or its obligations under relevant international environmental treaties and agreements. The borrower is required to address impacts on physical cultural resources in projects proposed for WB financing, as an integral part of the EA process.

## **5.6 NATURAL HABITAT (OP 4.04)**

The policy implementation ensures that WB supported development projects give proper consideration to the conservation of natural habitats, in order to safeguard their unique biodiversity and ensure the sustainability of the environmental services and products which natural habitats provide to human society.

This policy is applicable when a project (including any subproject under a sector investment or financial intermediary loan) with the potential to cause significant conversion (loss) or degradation of natural habitats, whether directly (through construction) or indirectly (through) human activities induced by the project.

## **5.7 FORESTRY (OP/BP 4.36)**

The OP/BP 4.36 aims at enhancing the environmental and social contribution of forested areas, and the need to reduce deforestation. The protection of forests through the control of forest-related impact of all investment operations is a concern of the policy. It promotes the restriction of operations affecting critical forest and conservation areas, while requiring that the sector and other relevant stakeholders should be consulted as appropriate.

## **5.8 MANAGEMENT OF CULTURAL PROPERTY (OPN 11.03)**

The policy is premised on the need to investigate and take inventory of cultural resources likely to be affected. Mitigations are provided for in cases of adverse impacts on physical cultural resources. Mitigation measures should be undertaken in conjunction with the appropriate authorities, organizations and institutions who are also required to be consulted and involved in the management of cultural property. The Bank does not support development actions likely to significantly damage nonreplicable cultural property, and does assist only those projects sited or designed to prevent such damage.

## **5.9 ENVIRONMENTAL, HEALTH, AND SAFETY: GENERAL GUIDELINES**

The EHS Guidelines contain the performance levels and measures that are considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them. The applicability of the EHS Guidelines should be tailored to the hazards and risks established for each project on the basis of the results of an environmental assessment in which site-specific variables, such as host country context, assimilative capacity of the environment, and other project factors, are taken into account.

When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures than those provided in these EHS Guidelines are appropriate, in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.

### ***General Approach to the Management of EHS Issues at the Facility or Project Level***

Effective management of environmental, health, and safety (EHS) issues entails the inclusion of EHS considerations into business processes in an organized, hierarchical approach that includes the following steps:

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- Identifying EHS project hazards and associated risks as early as possible in the project cycle, including the incorporation of EHS considerations into the site selection process, project design process, engineering planning process for capital requests, engineering work orders, facility modification authorizations, or layout and process change plans.
- Involving EHS professionals, who have the experience, competence, and training necessary to assess and manage EHS impacts and risks, and carry out specialized environmental management functions including the preparation of project or activity-specific plans and procedures that incorporate the technical recommendations presented in this document that are relevant to the project.
- Understanding the likelihood and magnitude of EHS risks, based on:
  - *The nature of the project activities, such as whether the project will generate significant quantities of emissions or effluents, or involve hazardous materials or processes;*
  - *The potential consequences to workers, communities, or the environment if hazards are not adequately managed, which may depend on the proximity of project activities to people or to the environmental resources on which they depend.*
- Prioritizing risk management strategies with the objective of achieving an overall reduction of risk to human health and the environment, focusing on the prevention of irreversible and / or significant impacts.
- Favoring strategies that eliminate the cause of the hazard at its source, for example, by selecting less hazardous materials or processes that avoid the need for EHS controls.
- When impact avoidance is not feasible, incorporating engineering and management controls to reduce or minimize the possibility and magnitude of undesired consequences, for example, with the application of pollution controls to reduce the levels of emitted contaminants to workers or environments.
- Preparing workers and nearby communities to respond to accidents, including providing technical and financial resources to effectively and safely control such events, and restoring workplace and community environments to a safe and healthy condition.
- Improving EHS performance through a combination of ongoing monitoring of facility performance and effective accountability.

**Table 5.1 The General EHS Guidelines cover the following areas:**

<b>Air Emissions and Ambient Air Quality</b>	<b>Communication and Training</b>	<b>Life and Fire Safety (L&amp;FS)</b>
<i>Energy Conservation</i>	<i>Physical Hazards</i>	<i>Traffic Safety</i>
<i>Wastewater and Ambient Water Quality</i>	<i>Chemical Hazards</i>	<i>Transport of Hazardous Materials</i>
<i>Water Conservation</i>	<i>Biological Hazards</i>	<i>Disease Prevention</i>
<i>Hazardous Materials Management</i>	<i>Personal Protective Equipment (PPE)</i>	<i>Emergency Preparedness and Response</i>
<i>Waste Management</i>	<i>Special Hazard Environments</i>	<i>Environment</i>
<i>Noise</i>	<i>Monitoring</i>	<i>Occupational Health &amp; Safety</i>
<i>Contaminated Land</i>	<i>Water Quality and Availability</i>	<i>Community Health &amp; Safety</i>
<i>General Facility Design and Operation</i>	<i>Structural Safety of Project Infrastructure</i>	

## 5.10 THE WORLD BANK'S POLICY ON DISCLOSURE

The Bank's policy on disclosure currently under review requires that all the people residing in the given areas of a project have the right to be informed of the proposed development project in their respective areas. Prior to

project appraisal therefore, the summary of the study of the development action along with other relevant information should be disclosed to or at the level of the Bank and the project area.

### **5.11 ENVIRONMENT (PROTECTION) ACT, 1986**

The Environment (Protection) Act (EPA) is a comprehensive law on the subject. EPA empowers the Government of India (Gol) to take all measures necessary to protect and improve the environment and to prevent pollution of the environment. In terms of responsibilities, EPA and associated Rules require obtaining Environmental Clearance (EC) for specific types of new/expansion projects and for submission of an environmental statement to the State Pollution Control Board annually. The details in this regard are notified under Environmental Impact Assessment (EIA) Notification, 14th September 2006.

### **5.12 EIA NOTIFICATION, 2006**

As per the EIA Notification, 14th September 2006 and its amendments, new projects or activities and expansion of existing projects require prior EC. Projects have been grouped under Category 'A' requiring clearance from Expert Appraisal Committee (EAC) of Ministry of Environment and Climate Change (MoEFCC), Gol and Category 'B' requiring clearance from the State/UT Environment Impact Assessment Authority (SEIAA). The SEIAA is required to base its decision on the recommendations of a State or UT level Expert Appraisal Committee (SEAC). The concerned Committee (EAC or SEAC) will finalize the Terms of Reference (TOR) on the basis of Form-1 and supplementary Form IA, proposed TOR & Pre-Feasibility/ Feasibility Report. EIA study is to be carried out as per the TOR provided by the Committee. Public hearing is required for Category 'A' projects. Building and construction projects with  $\geq 20,000$  sq. m and  $< 1,50,000$  sq. m of built up area is categorized as 'B' and EC is to be obtained from SEAC. Projects for new National Highways (NH) and expansion of NH greater than 30 km involving additional right of way greater than 20m involving land acquisition and passing through more than one state is categorized as 'A' and EC is to be obtained from EAC of MoEFCC. All State Highway (SH) projects and expansion of SH in hilly terrain (above 1,000 m above mean sea level) and or Ecologically Sensitive areas is categorized as 'B' and EC is to be obtained from SEIAA.

### **5.13 COASTAL REGULATION ZONE NOTIFICATION (CRZ), 2011**

The Ministry of Environment and Forests had issued the Coastal Regulation Zone (CRZ) Notification on 06.1.2011 under the Environment (Protection) Act, 1986, with the aim to provide comprehensive measures for the protection and conservation of our coastal environment. The main objectives of the Coastal Regulation Zone Notification, 2011 are:

- (a) to ensure livelihood security to the fishing communities and other local communities living in the coastal areas;
- (b) to conserve and protect coastal stretches and;
- (c) to promote development in a sustainable manner based on scientific principles, taking into account the dangers of natural hazards in the coastal areas and sea level rise due to global warming

The CRZ area was classified as CRZ-I (ecological sensitive), CRZ-II (built-up area), CRZ-III (Rural area) and CRZ-IV (water area). Table below presents key features of Coastal Regulation Zone Act, 2011.

**Table 5.2 Salient Features of CRZ Act, 2011**

<b>CRZ-I (ecological sensitive)</b>	<ul style="list-style-type: none"> <li>The CRZ Notification, 2011 clearly lists out the areas that fall within the category of CRZ-I. It includes:- <ol style="list-style-type: none"> <li>Ecologically sensitive areas and the geomorphological features that play a primary role in maintaining the integrity of the coast. <ul style="list-style-type: none"> <li>✓ Mangroves, in case mangrove area is more than 1000 square meters, a buffer area of 50 meters shall be provided;</li> <li>✓ Corals and coral reefs and associated biodiversity;</li> <li>✓ Sand Dunes;</li> <li>✓ Mudflats which are biologically active;</li> <li>✓ National parks, marine parks, sanctuaries, reserve forests, wildlife habitats and other protected areas under the provisions of Wild Life (Protection) Act, 1972 (53 of 1972), the Forest (Conservation) Act, 1980 (69 of 1980) or Environment (Protection) Act, 1986 (29 of 1986); including Biosphere Reserves encompassing; <ul style="list-style-type: none"> <li>○ Salt Marshes;</li> <li>○ Turtle nesting grounds;</li> <li>○ Horse shoe crabs habitats;</li> <li>○ Sea grass beds;</li> <li>○ Nesting grounds of birds;</li> <li>○ Areas or structures of archaeological importance and heritage sites;</li> </ul> </li> </ul> </li> <li>✓ The area between Low Tide Line and High Tide Line.</li> </ol> </li> </ul>
<b>CRZ - II</b>	<ul style="list-style-type: none"> <li>The Notification defines CRZ-II as the areas which are developed upto or close to the shoreline and falling within municipal limits.</li> </ul>
<b>CRZ - III</b>	<ul style="list-style-type: none"> <li>CRZ-III areas are those areas that are relatively undisturbed and do not fall under either in Category I or II and also include rural and urban areas that are not substantially developed</li> </ul>
<b>CRZ - IV</b>	<ul style="list-style-type: none"> <li>The aquatic area from low tide line upto territorial limits is classified as CRZ-IV including the area of the tidal influenced water body.</li> </ul>
<b>Permissible activities under CRZs</b>	<ul style="list-style-type: none"> <li>The activities permitted in CRZ-I under the 2011 Notification relate to the following:- <ul style="list-style-type: none"> <li>No new construction shall be permitted in CRZ-I except; <ul style="list-style-type: none"> <li>✓ Projects relating to the Department of Atomic Energy;</li> <li>✓ Pipelines, conveying systems including transmission lines;</li> <li>✓ Facilities that are essential for activities permissible under CRZ-I;</li> <li>✓ Installation of weather radar for monitoring of cyclones movement and prediction by the Indian Meteorological Department;</li> <li>✓ Construction of trans-harbour sea link and roads on stilts or pillars without affecting the tidal flow of water, between LTL and HTL.</li> <li>✓ Development of green field airport already permitted at only Navi Mumbai;</li> </ul> </li> </ul> </li> <li>Between Low Tide Line and High Tide Line in areas which are not ecologically sensitive, the following may be permitted; <ul style="list-style-type: none"> <li>✓ Exploration and extraction of natural gas;</li> <li>✓ Construction of dispensaries, schools, public rain shelter, community toilets, bridges, roads, jetties, water supply, drainage, sewerage which are required to meet the needs of traditional inhabitants living within the biosphere reserves after obtaining approval from concerned CZMA.</li> <li>✓ Salt harvesting by solar evaporation of seawater;</li> <li>✓ Desalination plants;</li> <li>✓ Storage of non-hazardous cargo such as edible oil, fertilizers and food grain within notified ports;</li> </ul> </li> <li>Construction of trans-harbour Sea links, roads on stilts or pillars without affecting the tidal flow of water.</li> </ul>
<b>CRZ - II</b>	<ul style="list-style-type: none"> <li>Buildings are permissible on the landward side of the existing road, authorized structure or hazardous line where there are no authorized structures.</li> <li>Other activities such as desalination plants and storage of non-hazardous cargo are also permissible.</li> <li>The Floor Space Index and Floor Area Ratio for construction projects shall be as on 19.2.1991 except for those specified in the CRZ</li> </ul>
<b>CRZ - III</b>	<ul style="list-style-type: none"> <li>All permissible activities for CRZ-III as listed in the CRZ Notification, 1991 are retained in the Notification. Between 0-200 meters from HTL is a "No Development Zone" where no construction shall be permitted</li> </ul>
<b>CRZ-IV</b>	<ul style="list-style-type: none"> <li>In CRZ-IV areas, there is no restriction on the traditional fishing and allied activities undertaken by local communities. However, no untreated sewage, effluents or solid waste shall be let off or dumped in these areas. A comprehensive plan for treatment of sewage generating from the city must be formulated within a period of one year from the date of issue of this Notification and be implemented within two years thereafter.</li> </ul>
<b>Provisions for the Fisher folk Communities</b>	
<b>Special provision for the Fisher folk communities</b>	<ul style="list-style-type: none"> <li>No restrictions are being imposed on any fishing activities and allied activities of the traditional fishing communities</li> </ul>
<b>State Specific provision for the Fisher folk communities</b>	<ul style="list-style-type: none"> <li>Special provisions have also been incorporated for the fishermen communities living along the coastal areas in Maharashtra, Goa, Kerala, Sunderbans and other ecologically sensitive areas.</li> </ul>

<b>Measures to Combat Pollution</b>	
<b>Prevention of Pollution in coastal waters</b>	<ul style="list-style-type: none"> <li>• The 2011 Notification lists out certain measures that have to be taken to prevent pollution in the coastal areas/coastal waters. The disposal of wastes and effluents into coastal waters is a prohibited activity. All coastal states are required to ensure that:</li> <li>• The existing practice of discharging untreated waste and effluents is phased out within a period not exceeding two years</li> <li>• Dumping of solid waste is phased out within one year from the commencement of the Notification.</li> <li>• An Action Plan is to be prepared for dealing with pollution in coastal areas and waters and in a time bound manner.</li> <li>• The Action Plan is submitted to MoEF who would provide technical and financial assistance.</li> </ul>
<b>Enforcing the CRZ Notification</b>	
<b>Enforcing the CRZ Notification</b>	<ul style="list-style-type: none"> <li>• 2011 notification lays out the method and the time frame in which actions shall be taken against any violations of the Notification.</li> </ul>
<b>Coastal areas requiring special consideration</b>	<ul style="list-style-type: none"> <li>• Coastal areas like Greater Mumbai, Kerala, Goa and Sunderbans are provided with special provisions like construction, reconstruction and fishing activities along the coast.</li> </ul>
<b>Island Protection Zone Notification</b>	
<b>Island Protection Zone Notification, 2011</b>	<ul style="list-style-type: none"> <li>• Separate notification is being issued which takes into account the management of the entire islands (Andaman and Nicobar Islands and Lakshadweep)</li> </ul>
<b>CRZ Clearance</b>	
<b>Procedure and Time frame for CRZ clearance</b>	<ul style="list-style-type: none"> <li>• CRZ Clearance to be obtained for project activities as per 2011 notification</li> </ul>
<b>Form 1</b>	<ul style="list-style-type: none"> <li>• Included the format for applying CRZ clearance from MoEF/ SEIAA</li> </ul>

#### 5.14 FOREST (CONSERVATION) ACT, 1980 (FCA)

This Act provides for the conservation of forests and regulating diversion of forestlands for non-forestry purposes. When projects fall within forestlands, prior clearance is required from relevant authorities under the FCA. State Governments cannot de-reserve any forestland or authorize its use for any non-forest purposes without approval from the Central Government. For diversion of forestland, the project proponent needs to apply to the State Government. Depending on the area required to be diverted, the proposals are considered and permitted if deemed fit by MoEFCC or its Regional offices. There is provision for payment of the cost of compensatory afforestation, cost of rehabilitation of endangered/rare species of flora/fauna, and the net present value of the forest resources upfront with the state Forest Department. The procedural provisions provide that::

- If the area of forests to be diverted exceeds 20 ha (or 10 ha in hilly area), prior permission of Central Government is required;
- If the area of forest to be diverted is between 5 to 20 ha, the Regional Office of Chief Conservator of Forests is empowered to approve;
- If the area of forest to be diverted is below or equal to 5 ha, the State Government can give permission; and,
- If the area to be clear-felled has a forest density of more than 40%, permission to undertake any work is needed from the Central Government, irrespective of the area to be cleared.

#### 5.15 WATER (PREVENTION & CONTROL OF POLLUTION) ACT, 1974

The Water (Prevention and Control of Pollution) Act, 1974 provides for the prevention and control of water pollution, and for the maintaining or restoring of wholesomeness of water in the country. It places restrictions on discharge of any poisonous, noxious or polluting matter into any stream/well/sewer/land. It also restrains act that permits entry into stream of any matter that may impede the proper flow of water of the stream in a manner leading or likely to lead to a substantial aggravation of pollution due to other causes or of its consequences. The State and Central Pollution Control Boards are empowered to enforce the provisions of this act.

The industries causing discharge of effluent are required to take permission of the concerned State Pollution Control Board. Such permission is given subject their meeting prescribed norms on which they are required to submit regular reports. The construction work and disposal of debris must be in manner as not to violate the Water (Prevention & Control of Pollution) Act, 1974.

#### **5.16 AIR (PREVENTION & CONTROL OF POLLUTION) ACT, 1981**

The Air (Prevention & Control of Pollution) Act, 1981 provides for the prevention, control and abatement of air pollution. This act requires permission to be obtained for establishing and operating any industrial plant from concerned State Pollution Control Board. Such permission is given subject their meeting prescribed norms on which they are required to submit regular reports. The establishment of hot mix plant and stone crusher would attract provisions of this act. Also all the vehicles, equipment and plants are required to meet prescribed norms of emission.

#### **5.17 ANCIENT MONUMENTS AND ARCHAEOLOGICAL SITES AND REMAINS ACT, 1958**

This act provides for protection of ancient monuments and archeological sites. The legal requirement is to obtain from ASI a no-objection certificate if any protected cultural property is within 10 km of the project.

#### **5.18 THE RIGHT TO FAIR COMPENSATION AND TRANSPARENCY IN LAND ACQUISITION, REHABILITATION AND RESETTLEMENT ACT, 2013:**

The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 is a legislation that regulates land acquisition and provides laid down rules for granting compensation, rehabilitation and resettlement to the affected persons. The Act has provisions to provide fair compensation to those whose land is taken away, brings transparency to the process of acquisition of land to set up factories or buildings, infrastructural projects and assures rehabilitation of those affected. The highlights of the Act are as below and section wise details of the Act are indicated in the Annex 5.

- The Act provides for land acquisition as well as rehabilitation and resettlement. It replaces the Land Acquisition Act, 1894.
- The process for land acquisition involves a Social Impact Assessment survey, preliminary notification stating the intent for acquisition, a declaration of acquisition, and compensation to be given within a certain time. All acquisitions require rehabilitation and resettlement are to be provided to the people affected by the acquisition
- Compensation for the owners of the acquired land shall be four times the market value in case of rural areas and twice in case of urban areas.
- In case of acquisition of land for use by private companies or public private partnerships, consent of 80 percent of the displaced people will be required. Purchase of large pieces of land by private companies will require provision of rehabilitation and resettlement.
- The provisions of this Act shall not apply to acquisitions under 16 existing legislations including the Special Economic Zones Act, 2005, the Atomic Energy Act, 1962, the Railways Act, 1989, etc.

**Table 5.3 THE RIGHT TO FAIR COMPENSATION AND TRANSPARENCY IN LAND ACQUISITION, REHABILITATION AND RESETTLEMENT ACT, 2013**

<b>Section</b>	<b>Aspect</b>	<b>Provision</b>
<b>Preliminary Investigation for Determination of Social Impact and Public Purpose</b>		
4	Preparation of Social Impact Assessment (SIA)	Undertaking a SIA to estimate the potential impacts in consultation with the concerned Panchayat/ Municipality/ Municipal Corporation
5	Public hearing for SIA	Public hearing to be held in the affected area after giving adequate publicity about date, time and venue for public hearing
6	Publication of SIA	SIA Report and Management Plan to be made available in the local language to the Panchayat/ Municipality/ Municipal Corporation



Section	Aspect	Provision
<b>Appraisal of Social Impact Assessment Report by an Expert Group</b>		
7	Appraisal of the SIA by an expert group	SIA to be evaluated by an independent multi- disciplinary expert group as constituted under the project
8	Examination of proposals for land acquisition and SIA report by appropriate govt.	Recommend such area for acquisition that would ensure minimum displacement of people, minimum disturbance to infrastructure, ecology and minimum adverse impact on the individuals affected.
<b>Notification and Acquisition</b>		
11	Publication of preliminary notification and power of officers thereupon	Publishing of notification in official gazette, in 2 daily newspapers including one in regional language, upload on appropriate govt. website.
12	Preliminary survey of land and power of officers to carry out survey	To determine the extent of land to be acquired
14	Lapse of SIA report	If a preliminary notification is not issued as per section 11 within 12 months of the appraisal of the SIA report by expert group, then a fresh SIA shall be required to be carried out.
15	Hearing of Objections	Any person affected by the notification under section 11 may within 60 days object to the preliminary notice of land acquisition.
16	Preparation of Rehabilitation and Resettlement Scheme (R & R S)	Conduct of census survey of the affected families.
17	Review of the R & RS	Review of the R & RS by the Collector
18	Approved R & RS to be made public	Approved R & RS to be made available in the local language to the Panchayat/ Municipality/ Municipal Corporation
19	Publication of declaration and summary of R & RS	Final declaration of R & RS along with a declaration of a resettlement area
21	Notice to persons interested	Publishing of public notice for acquisition of land
23	Enquiry and land acquisition award	Collector shall enquire into objections and make award of compensation due
25	Period within which an award shall be made	Collector shall make an award with a period of 12 months from the date of publication of declaration under section 19.
26	Determination of Market value of land	Determination of Market value of land by Collector based on the provisions of the subsections
27-30	Determination of compensation and award of solatium	
<b>Rehabilitation and Resettlement Award</b>		
31	Award of R & R for affected families	R & R award for affected families by Collector as per the entitlements provided
<b>Establishment of Land Acquisition, Rehabilitation and Resettlement Authority</b>		
64	Reference to R & R Authority	In case of disagreement on the price awarded, within 6 weeks of the award the parties can put an objection to the Collector; if the collector doesn't respond within 30 days then person can represent the case to the R & R Authority.
74	Appeal to High Court	Any person aggrieved by the award passed by the R & R Authority under section 69 may file an appeal in High Court.

### 5.19 THE SEXUAL HARASSMENT OF WOMEN AT WORKPLACE (PREVENTION, PROHIBITION AND REDRESSAL) ACT, 2013

The Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013 is based on the Vishaka Guidelines that were stipulated by the Supreme Court of India, in Vishakha and others v State of Rajasthan case in 1997, regarding sexual harassment at workplace. The court stated that these guidelines were to be implemented until legislation is passed to deal with the issue. The court decided that the consideration of "International Conventions and norms are significant for the purpose of interpretation of the guarantee of gender

equality, right to work with human dignity in Articles 14, 15 19(1)(g) and 21 of the Constitution and the safeguards against sexual harassment implicit therein."

The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013 is a legislative act in India that seeks to protect women from sexual harassment at their place of work. The Act came into force from 9 December 2013 and would be required to adhere to at the depot sites and PIUs.

## 5.20 APPLICABILITY OF ENVIRONMENT RELATED ACTS

In order to understand the extent of the environmental and social assessment for the proposed improvement works, applicable laws, legislation and policies have been reviewed. A summary of environmental legislations / regulations relevant to the project are presented in the Table 5-4.

**Table 5-4: Applicability of Environment Related Acts**

Policy/Act/Rule	Year	Purpose	Responsible Institution	Applicability
Environment (Protection) Act.	1986	To protect and improve the overall environment	MoEF	Applicable for the project
Notification on Environment Impact Assessment of Development projects (and amendments)	2006 2009 2011	To provide environmental clearance to new development activities following environmental impact assessment.	MoEF	Applicable for the project where building construction of more than 20,000 sq m is involved
Wildlife Protection Act	1972	To protect wild animals and birds through the creation of National Parks and Sanctuaries	MoEF	Applicable for the project in National Park is within 10 km radius of the project sites
Coastal Regulation Zone (CRZ) notification	2011	To provide for protection of the fragile coastal belt, through development controls and regulations	GCZMA	Applicable for the project 20 MPCS & 23 Roads are falling in CRZ.
Water (Prevention and Control of Pollution) Act (and subsequent amendments)	1974	To provide for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water.	GPCB	Applicable for the project as per the EPA, 1986
Air (Prevention and Control of Pollution) Act (and subsequent amendments)	1981	To provide for the prevention, control and abatement of air pollution, and for the establishment of Boards to carry out these purposes.	GPCB	Applicable as per the EPA, 1986
Noise Pollution (Regulation and Control) rules 2000	2001	Noise pollution regulation and controls	GPCB	Applicable for the project as per the EPA, 1986
Central Motor Vehicle Act & Central Motor Vehicle Rules	1988 1989	To control vehicular air and noise pollution. To regulate development of the transport sector, check and control vehicular air and noise pollution.	R & B, PWD, Transportation Department of respective states	Applicable for all the vehicles used for construction purposes
The Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act	2010	To amend the Ancient Monuments and Archaeological Sites and Remains Act, 1958, including declaration of regulated and prohibited areas around the monuments.	Department of Archaeology, of respective states, National Monuments authority	Not applicable unless any Chance Find archaeological properties are identified during the construction stage.
Forest (Conservation) Act	1980 with amendments in 1988	An Act to stop large-scale diversion of forestland for non-forest use.	MoEF, Department of Forests, of respective states	Not applicable, as none of the projects are located in forest areas
Hazardous Wastes (Management and Handling) Rules	1989	Rules framed under the Environment Protection Act, 1986. These rules aim at controlling the generation, storage and import of hazardous chemicals.	MoEF	Applicable for the project as the project involves handling of waste oils and their disposal
Chemical Accidents (Emergency Planning, Preparedness and Response) Rules	1996	Rules framed under the Environment Protection Act, 1986 for preparedness and response, during operation of on-site and Off-site Emergency Plans during chemical disaster	MoEF, Crisis groups in State and Districts	Applicable for all cities as the project involves handling and usage of chemicals



## 5.21 ANTICIPATED IMPACTS AND ENTITLEMENT FRAMEWORK FOR THE NCRMP-II

The Entitlement Framework for the Project has been drafted keeping in view perceived social impacts as listed below:

- Impacts on non-titleholder – encroacher and squatters both residential and commercial;
- Impact on livelihood of informal sector/ vendors etc.
- Impacts on vulnerable groups including women; and
- Impacts on community properties.

The entitlements for each of the above mentioned impact categories have been provided for in Entitlement Framework for the project. The Framework has also drawn from the provisions of each of the policies mentioned above. The Framework is described in the Table below:

**Table 5.5 : Entitlement Framework for GSDMA**

Category		Type of Loss	Unit of Entitlement	Entitlement	Details
A	Non-Titleholders	Encroachers	Household		<ul style="list-style-type: none"> <li>• Will receive no compensation for land but assistance for shifting assets to the vulnerable groups (SC, ST, Women Headed Households and poor). Such assistance shall be given only to residential and commercial properties;</li> <li>• Encroachers will be notified a time in which to remove their assets;</li> <li>• Right to salvage materials from the demolished structure.</li> </ul>
		Squatters	Household	Assistance	<ul style="list-style-type: none"> <li>• Right to salvage materials from the demolished structure</li> <li>• Shifting assistance of Rs. 10,000 for each displaced family.</li> <li>• Additional lump sum assistance of Rs. 10,000 per household to vulnerable groups such as – female headed households, households with disabled family members, households below poverty line, scheduled tribe and scheduled caste households etc.</li> </ul>
B	Informal Business	Mobile and ambulatory vendors and Kiosks	Household	Assistance	<p>To be provided assistance as per the Street Vendor's Act, 2014:</p> <ul style="list-style-type: none"> <li>• <i>Provided with a certificate to vend</i></li> <li>• <i>Relocation/eviction shall be carried out by giving 30days notice</i></li> <li>• <i>Relocated to a defined vending zone.</i></li> </ul>
C	Community infrastructure, cohesion and amenities	Common property resources	Community	Conservation, protection, compensatory replacement	<ul style="list-style-type: none"> <li>• The common property resources and the community infrastructure shall be relocated in consultation with the community</li> </ul>
D	Disruption	Temporary construction related impacts	Household	Assistance may be considered in special cases.	<ul style="list-style-type: none"> <li>• Access to be maintained and when disruption occurs, losses can be substantiated, "assistance" will be considered for business losses.</li> </ul>

## Chapter 6 –Project Component & Scope of Work

### 6.1 PROJECT COMPONENTS

Gujarat component of NCRMP include provision of infrastructure to provide for early warning system, shelter for distressed homeless due to disaster, roads for supply of relief material and evacuation and underground cabling for twin towns Gandhidham and Adipur of District Kutch.

Gujarat State Disaster Management Authority (GSDMA) has mandate to prepare programmes and plans to mitigate the losses on account of disasters as a strategy for long terms disaster preparedness in Gujarat.

The main Components of the Project are:

**B1. Construction of Multipurpose Cyclone Shelters (MPCS)**

**B2. Construction of Approach Roads & Bridges**

Thousands of lives perished due to non-availability of protected shelters, particularly in the areas prone to storm surge. In the aftermath of the Super Cyclone, the State Government decided to build elevated structures, which can withstand very high wind speeds and protect human and animal lives from flooding and saline inundation.

The present work includes 100 MPCS located at 11 coastal districts and 43 access roads located at 08 districts of Gujarat are as in Table-6.1

**Table -6.1 Summary of District wise MPCS & Roads**

Sl.No	District	Scope of Work			
		Total MPCS	Total Packages MPMC	Total Roads	Total Packages Road
1	2	3	4	5	6
1	Ahmedabad	1	1	6	2
2	Amreili	2	1		
3	Anand			2	1
4	Bharuch	5	2	21	7
5	Bhavnagar			2	2
6	Devbhumi Dwarka	5	2		
7	Gir Somnath	44	23		
8	Jamnagar	2	1		
9	Junagarh	28	13		
10	Kutchh	5	3	1	1
11	Morbi	1	1		
12	Navasari	1	1	4	1
13	Porbander	6	3		
14	Surat			6	2
15	Valsad			1	1
	<b>Total</b>	<b>100</b>	<b>51</b>	<b>43</b>	<b>17</b>

### 6.2 MULT IPURPOSE CYCLONE SHELTERS (MPCS)

The project provided for construction of 100 MPCS. During the course of implementation it was decided to provide for more dispersed infrastructure to provide facilities for larger number of villages in the coastal area. Accordingly it was decided that all the MPCS shall be constructed will be of 550 capacity. This will allow for constructing MPCS in more number of villages. The revised program provided for construction of 100 MPCS of 550 capacity with the funds available in the project.

**Table – 6.2 Summary of District wise Taluk wise MPCS Sites**

District	Taluka	Number of MPCS of 550 capacity
Ahmedabad	Dholera	1
Amreli	Jafrabad	2
Bharuch	Hansot	1
	Vagra	3
	Jambusar	1
	<b>S. Total</b>	<b>5</b>
Devbhumi Dwarka	Kalyanpur	3
	Okhamandal	2
	Total	5
Gir Somnath	Kodinar	10
	Patan-Veraval	7
	Sutrapada	7
	Una	20
	<b>S. Total</b>	<b>44</b>
Jamnagar	Lalpur	2
Junagadh	Malia	7
	Mangrol	21
	<b>S. Total</b>	<b>28</b>
Kutch	Bhachau	1
	Gandhidham	2
	Mandvi	2
	<b>S. Total</b>	<b>5</b>
Morbi	Maliya	1
Navsari	Jalapore	1
Porbandar	Porbandar	6
<b>G.Total</b>		<b>100</b>

### 6.3 MPCS MANAGEMENT

The primary purpose of the MPCS is to provide shelter to people rendered homeless at time of natural disaster. However, it is necessary that the MPCS building is kept clean, free of insects and dirt and building is maintained with all its facilities and fixtures in working condition. Any infrastructure if not cleaned and maintained is likely to fall in disuse and the available facilities in it rendered unusable when needed most. Dispersed infrastructure like MPCS constructed for community is best maintained with community participation.

### 6.4 CYCLONE SHELTER MANAGEMENT & MAINTENANCE COMMITTEE (CSMMC) OF MPCS:

- Basic aim of CSMMC to manage and maintain the Multi - Purpose Cyclone Shelter (MPCS) constructed by Gujarat State Disaster Management Authority (GSDMA) as a caretaker of the community asset on behalf of GSDMA and the community
- To ensure lawful use of the building. Endeavour to use for revenue generation through activities under the scope of the GR,
- To establish and maintain relation with field level officials of different departments of the Government, VDMC members and NGOs for better preparedness and management of activities during disaster.

GSDMA concerned at need to make institutional arrangement with community participation for upkeep and maintenance of the MPCS infrastructure GSDMA proposed constitution of Cyclone Shelter Management and Maintenance Committee (CSMMC) to Government of Gujarat. The revenue department of the Government of Gujarat issued Government Resolution in this regard vide resolution number Bh KaPa-10-2016-Pu. Va.Pu. Ni. Dated 10-10-2017, Annex- H. GSDMA has drawn detailed

plan for building capacity of the community to meet the exigency due to disaster. The Capacity Building plan for a resilient community in Gujarat under the National Cyclone Risk Mitigation Project – II is being pursued by the GSDMA. This plan includes Memorandum of Association for constitution of CSMMC and various programs for orientation and training of CSMMC members and village community.

#### **6.5 GUIDELINES FOR USE OF MPCs:**

- Primary use of the cyclone shelter is for protecting people from the vagaries of nature such as flood, cyclone and tsunami act as relief camp during other disasters.
- The shelter should always be made and protected keeping all concerns pertinent to its primary use.
- The features pertinent to other uses should then be overlapped with those of the primary use of the shelter with no compromise on its primary use.
- To encourage local innovations based on local needs and necessities identified by the village communities to be fitted in.
- The use of cyclone shelters for housing the offices which are of the permanent occupation nature (e.g. Panchayat offices, hospitals etc.) has to be discouraged, since these offices cannot be relocated during the periods of occurrence of natural disasters, which occur without prior notice, and hence hinders the usability of the shelter for the primary purpose for which it is meant.
- The cyclone shelter should ultimately become a “Community asset/resource” such that it will have a broader impact on the livelihood of the villages. Hence, it is appropriate to locate the cyclone shelters inside or near the villages. Ultimately, the idea is to assure their regular use during the normal period as well.
- Using the shelter as primary school on regular basis will not come in the way of sheltering since most rural primary schools use mats for seating the children and where low height desks/benches may be used, they could be stored in a small space or used for people sitting or standing on them.
- Other temporary uses may be for village gatherings, camps, marriages, and other community activities.
- Such a sustainable use should also generate required finances to supplement proper maintenance of the structure.

#### **6.6 SUSTAINABLE USE OF MPCs DURING NON -CYCLONE PERIOD:**

MPCs provide basic facilities for temporary habitation during cyclone period but for exploring the shelter building utilization in non-cyclone period for other purpose through CSMMC like:

- Facilitation as Primary Health Care Centre for emergency room of MPCs Social gathering, public functions, common celebration of festival, as a school building etc.
  - Skill up-gradation training program of Horticulture Development Societies, Dairy Development Societies, Diversified Agriculture Support Project, Social Forestry, Formation & Strengthen of Self Help Groups (SHGs) & Community Based Organization (CBOs) etc.
  - E-marketing of agriculture produce by the farmers and establishing the sub-agriculture produce market committee hub of nearby villages & e-suidha for "Pradhan Mantri Fasal Bima Yojana" (PMFBY), "Gram Mitra Yojana" & also convergence with Fisheries department due to community livelihood depend upon coastal belt.
  - During Election, Pulse Polio camps, health camps and other awareness Sensitization schemes etc.
-

- The MPCS building shall also be allowed to be used social purposes including government functions on payment of small fee. However, care will have to be taken that the facility is not misused for anti-social, anti-national and political purposes. MPCS building shall not be allowed to be used on long-term basis for any activity other than school classes. GSDMA is required to issue detailed guidelines in this regard.

## 6.7 RESPONSIBILITIES OF CSMMC:

The CSMMC shall be responsible for four major areas of activities:

- The CSMMC is provided at village level with separate CSMMC for each village.
- Use of the shelter during normal times like Renting out shelter for social causes and socio economic development programme
- Raising Shelter management and maintenance fund (Make sure that no temporary/permanent structure is being built at the shelter premises without permission from GSDMA)
- Disaster preparedness of the community management during disaster
- The CSMMC shall be responsible for day-to-day management and maintenance of the MPCS in normal times.
- CSMMC shall permit application for use of the MPCS building as per the guidelines issued by GSDMA with specific mention of time for which use is permitted.
- The CSMMC shall also be responsible for management of the funds of the CSMMC including authorization of expenditure on maintenance and upkeep of the MPCS and facilities therein.
- CSMMC shall fix charges to be levied for use of MPCS for various purposes.
- CSMMC shall ensure maintenance of the equipment provided with MPCS to be readily available for deployment in times of need.
- The CSMMC shall work to increase capacity of the community to face the natural disasters.
- The interest earned on the corpus fund and the earnings from fee collected as rent shall be used for upkeep and maintenance of the MPCS. The CSMMC shall permit use of from this fund for the purpose
- Government shall provide an initial corpus of Rs. 1 lakh. This corpus will be provided to the CSMMC. The corpus fund and the earnings from rent shall be deposited in a joint account of Mamlatdar and the Member Secretary of the CSMMC.

## 6.8 MEMBERS OF CYCLONE SHELTER MANAGEMENT & MAINTENANCE COMMITTEE (CSMMC):

The members of the Cyclone Shelter Management & Maintenance Committee (CSMMC) are as under:

Particulars	Designation
Mamlatdar	Chairperson
Taluka Development Officer	Member
P.S.I. (of Police Station under which the MPCS is located)	Member
Sarpanch (of the village under which the MPCS is located)	Member
Village Talati	Member Secretary
School Principal (of the School of village under which the MPCS is located)	Member
D.P.O. (GSDMA)	Member
Adequate representation from women members will be ensured	Member
One representative of the vulnerable community, selected by the General Body or in case of urgency nominated by the Chairperson, would function as the member of the CSMMC	Member
Nominated member	Member

## **6.9 ROADS**

The project provided for construction of 43 roads in coastal areas of 8 districts. Most of these roads are existing BT roads that needed strengthening to meet standards that can withstand the flooding during the cyclone and provide for supply of food, medicine and other necessities during the natural disaster. During normal times these roads will add to communication infrastructure for coastal villages. This will help villagers access to markets for their produce and for them easy access for their needs. The roads will thus help in promoting development of the area and help increase income and improve quality of life in the region.

## Chapter 7.0 Methodology Screening Process, Impact & Risk Approach

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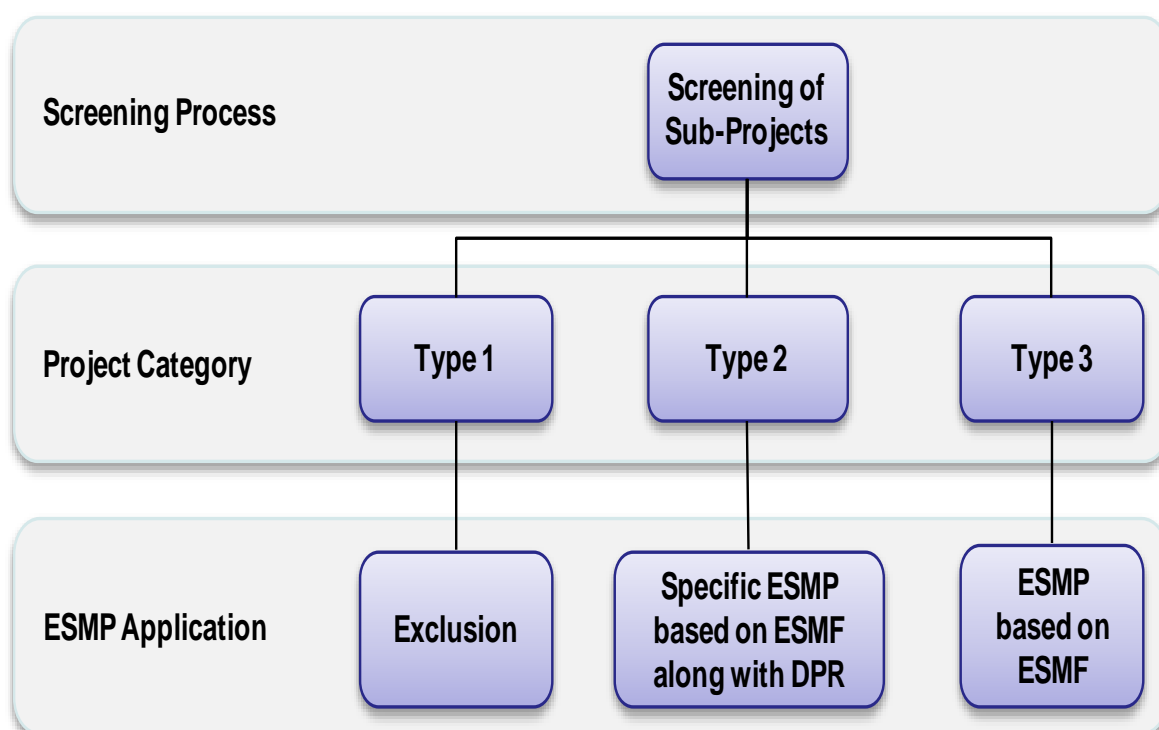
### 7.1 ENVIRONMENTAL AND SOCIAL SCREENING

The dispersed project sites are examined for their impact on environment and local community to be implemented under the proposed project will be first subject to an environmental/social screening in order to prevent execution of projects with significant negative environmental impacts.. Each of the MPCS site and road length accordingly is screened for environment and social impacts. Mitigation measures and regulatory clearance are accordingly planned.

The purpose of “environmental/social screening” is to get a preliminary idea about the degree and extent potential environmental impacts of a particular sub-project, which would subsequently be used to assess the need for further environmental/social assessment.

Screening shall be undertaken to categorise the sub-projects into:

- **Type 1** – The sub-projects that would involve land acquisition and/or significant social impacts. These sub-projects would need to be excluded from further consideration in the project.
- **Type 2** – The sub-projects that require a full review and are likely to involve environmental impacts and impacts on non-titleholders that would require a EIA / SIA and project specific EMP / RAP.
- **Type 3** – The sub-projects that would require limited review involving generic environmental and social impacts that could be addressed through a generic ESMP.



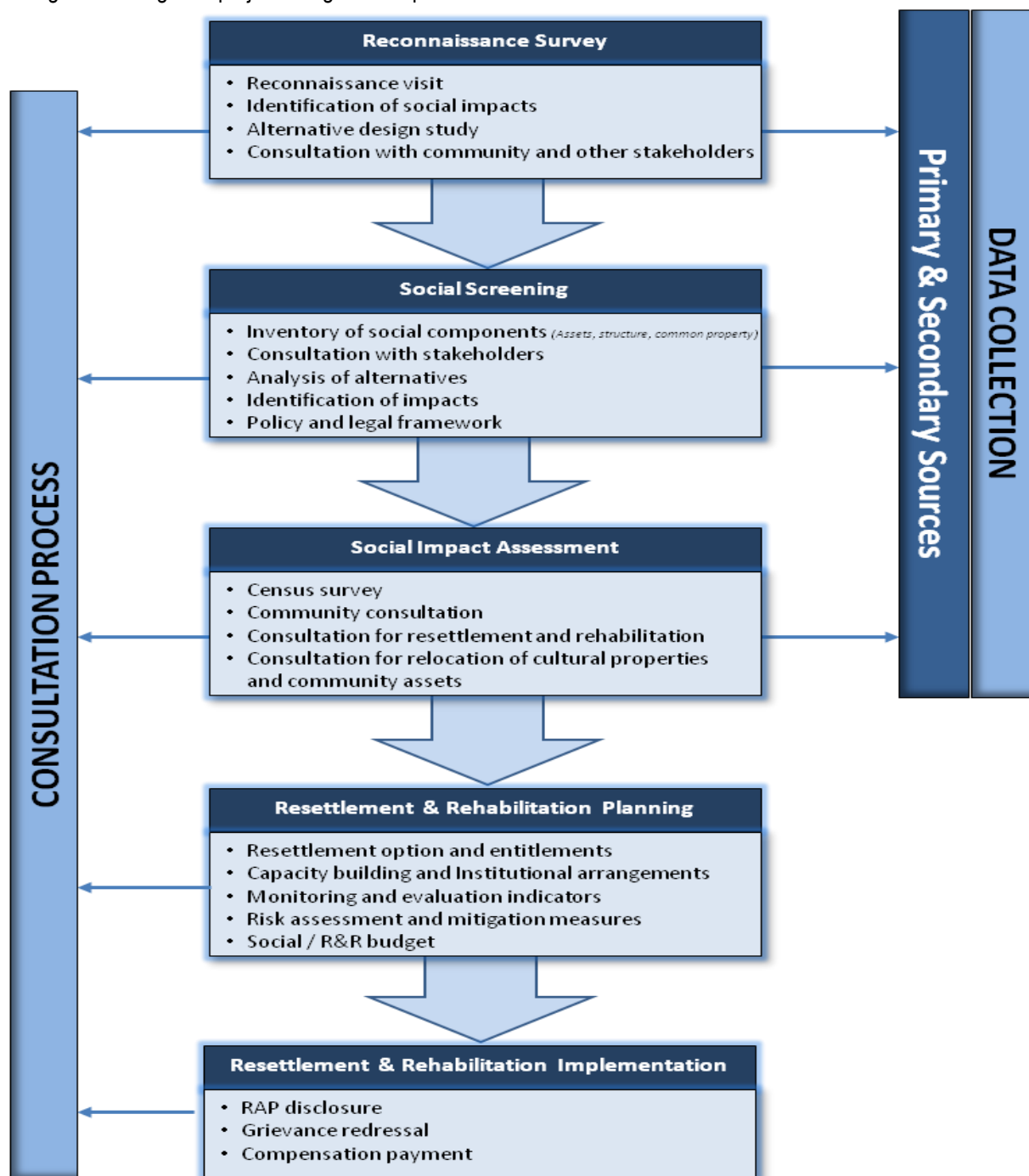
## 7.2 SCREENING PROCESS

Screening for identification of environmental and social impacts for project has been undertaken to ascertain the significance of environmental and social impacts.

The environmental/social screening involved:

- (i) reconnaissance of the project areas MPCS sites & Roads and their surroundings;
- (ii) identification of the major project activities, and
- (iii) preliminary assessment of the impacts of these activities on the ecological, physic-chemical and socio-economic environment of the sub-project surrounding areas

While environmental impacts identified are preliminary in nature, potential for occurrence has to be ascertained during further stages of project design and implementation. .





The magnitude of impacts based on the reconnaissance visits carried out, the nature of project activities and project vicinity, is worked out qualitatively based on perception as Low (L), Medium (M) and High (H).

The ESMF screening was conducted by the Environment expert of PMSC team of KPMG with participation of local people and officials. The process was initiated with initial meeting with officials of GSDMA in July 2014. Following documents were collected after the initial meeting:

1. ESMF prepared by NDMA that provides guidelines for the planning, design and construction of project interventions / sub-projects and help in harmonizing the principles/approaches for project preparation and execution.
2. Investment Proposal – Multipurpose Cyclone Shelters & Roads.
3. Contact details of local officials – District Project Coordinators (DPO) of GSDMA, Road and Building department, and Revenue department.
4. List of MPCs and road sites along with details of land allocated for the purpose like area, survey number, ownership.
5. Maps were obtained from the Bhaskaracharya Institute of Space Application and Geo-Informatics, Gandhinagar (BISAG). BISAG was requested to provide detailed site wise color maps. The maps provided location of land allotted MPCs construction and road alignment along with other details.
6. Other details on the maps included:
  - a) Village boundaries
  - b) Village settlement area
  - c) Rivers/drainage
  - d) Existing road network with distinguished marking for various categories of roads
  - e) The railway lines
  - f) Survey numbers
  - g) Wastelands
  - h) Location of schools, Primary Health Center/Community Health Center,
  - i) Forests, wildlife sanctuaries, mangrove areas, water bodies, environmental sensitive areas.
  - j) High Tide Line (HTL)
  - k) CRZ line
  - l) Village population;
  - m) Altitude range of the village

### **7.3 ENVIRONMENT AND SOCIAL SCREENING FORM**

The Environment and Screening format was developed using the draft format Environment and Social Management Framework is enclosed. The format was developed and finalized after initial testing. The format used for Environment and Social Screening of proposed MPCs and roads works of the project is available in Annex A and B of this document. \=

### **7.4 SITE VISITS**

The Environment expert of PMSC team visited each of the sites of MPCs and road alignment for environment and social screening. DPO, field officials of the Road & Building Department of the State Government, Mamlatdar or his representative, Talati and Sarpanch were requested to remain during the entire field visit. Village people specially elders were encouraged to participate in the field exercise and provide details of past incidences of cyclone and other natural disasters and the arrangements made then. The field visit included visit to:

1. The land allocated for MPCs site/ alignment of road proposed under the project. Village Talati, who
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maintains land records at village level helped in locating the allocated site? Geographical coordinates of the site were recorded with the help of Compass 12 application on mobile phone. This is approximation. However, exact site locations are marked on village maps provided by BISAG. ;

2. The village schools for location and capacity to provide for temporary shelter to people that may be rendered homeless by cyclone/flood or such natural disasters;
3. The village Panchayat Ghar to meet people of village including Sarpanch. Panchayat Ghar location and its capacity to provide for temporary shelter to people that may be rendered homeless by cyclone/flood or such natural disasters was also recorded;
4. Community center if any in the village was located and its capacity to provide for temporary shelter to people that may be rendered homeless by cyclone/flood or such natural disasters was recorded;
5. Village elders helped in recording frequency and historical occurrence of the natural disaster events and shelters used then.
6. Geographical coordinates of the MPCS sites, schools and Panchayat Ghar, community center for proposed MPCS and road ends for proposed project roads were recorded with the help of Compass12 application on mobile phone. This is approximation. However, exact site locations are marked on village maps provided by BISAG.
7. Location of following environmentally sensitive areas in vicinity of the MPCS sites and roads were collected during the survey:
  - a) Biosphere Reserve
  - b) National Park
  - c) Wildlife/ Bird Sanctuary
  - d) Tiger/ Elephant reserve
  - e) Wetland
  - f) Important bird areas
  - g) Coastal area with coral
  - h) Mangrove areas
  - i) Estuaries with mangrove
  - j) Natural lakes
  - k) Swamp/ mudflats
  - l) Habitat of wildlife
  - m) Migratory route of wild animals/ birds
  - n) Reserved/ Protected Forest
  - o) Zoological / Botanical Park
  - p) World Heritage sites
  - q) Archeological Monuments (under ASI's Central / State list)
  - r) Reservoir / Dam
8. Space application Centre, Ahmedabad maps of site provided input regarding CRZ.
9. Forest department officials were consulted wherever required to get information on movement of wildlife and sea turtle egg laying coasts.
10. Some information regards Important Bird Area (IBA) and path of migratory birds was availed from relevant authentic internet sites.
11. All this information and field observation were used to fill the Environment and Social Screening form in consultation with the DPO, officials of the R&B Department, Mamlatdar/ representative, Talati and Sarpanch.

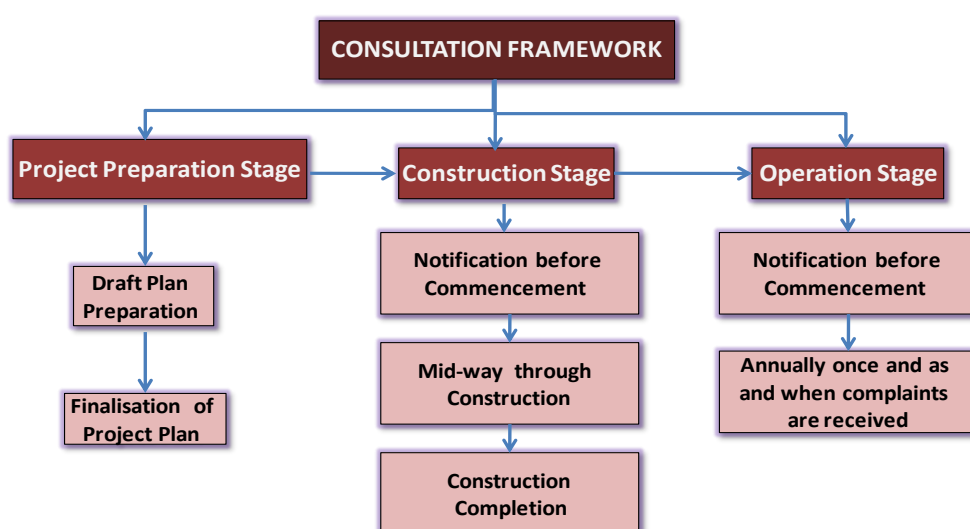
## **7.5 COMMUNITY CONSULTATIONS & FOCUS GROUP DISCUSSION:**

The National Cyclone Risk Management Project, public consultations & focus group discussion has been proposed for public awareness campaigns for appraising the short-term inconveniences and long term benefits of

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the project in order to gain full support of the beneficiaries. This will also helpful to make beneficiaries aware of preventive care to avoid environmental health related hazards during construction and of their responsibilities to during cyclone & non cyclone period including support to Cyclone Shelter Maintenance & Management Committee (CSMMC) for managing & maintaining the MPCS as a caretaker of the community. Objectives of the Public Consultations & Focus Group Discussion are as under:

- establish rapport between the project affected persons and other stakeholders for the success of the project;
- build an environment where people understand and appreciate the need and importance of the project;
- learn from the people about the issues in terms of the regional linkages, safety, and other social dimensions of the region/ area that need to be considered while execution of the project;
- facilitate the partnership and ownership of the community through their involvement in the decision making process; and
- Understand and incorporate the views of the people in the execution process in order to minimize the future resistance and delays.
- Recording/registering the grievance for redressal by the competent authority/ stakeholders.



Village community consultation for MPCS sites was held in two stages. First during the visit of the Environment Expert to the village local people were informally informed of the proposed project work and their significant inputs recorded. Formal community consultation was held in Gram Sabha (GS). Village officials placed the proposal before the GS at one of its meetings. Detailed information about the proposed MPCS was submitted to Gram Sabah. The opinion of GS was recorded in form of a resolution.

1. Mamlatdar was requested to advise Talati to call meeting of Gram Sabha and include the proposal of proposed construction of MPCS in the agenda of the GS.
2. The Gram Panchayat called the meeting of GS. The Talati as secretary of the GS informed the date and time of meeting of GS to DPO.
3. DPO coordinated the entire process of community consultation at GS. The GS meeting was attended by Sarpanch, Panchayat members, Principal of village school, ASHA Worker, Anganwadi Karyakar and the villagers who constitute the GS.
4. Information was made available to the village government officials of the proposal to construct the MPCS. The details made available included the purpose, site and the proposed arrangement for management of MPCS as per government resolution of Revenue

department number Bh KaPa-10-2016-Pu. Va.Pu. Ni. dated 10-10-2017

5. Government officials presented the details of MPCS as stated in para 4 above and requested to approve the proposal as it is interest of the village to have the MPCS available for use at times of disaster and the fact that its day to day management is with village level committee. It will add to the infrastructure available for village community for use during normal times within the framework of government resolution.
6. The Talati on the basis of discussions and the view of the Gram Sabha drew minutes of the GS meeting.
7. The Talati forwarded the minutes of the meeting of the Gram Sabha to the DPO.

### Public Consultation & Capacity Building in the Eye of Camera







## 7.6 ENVIRONMENT AND SOCIAL SCREENING OUTCOME

### A. MPCS sites

Environment Social assessment & analysis for the socio-economic impact is based on punch items, review of Right of Way (RoW) of approach road, review of implementation of the policies and procedures on site, assess if any encroachment cases have been identified at MPCS site and along the RoW of road, also assess the status of compliance to permitted conditions along with review of supporting documents, assess the adequacy of the roles and responsibilities of the personnel handling environmental and social risks and impacts, consultations undertaken with direct and indirect stakeholders of the project, identify gaps in compliance of labour regulatory requirements, assess if the road asset is passing through any scheduled areas, critical natural habitat and including evaluation of the adequacy of mitigation measures implemented in accordance with the Work Bank Performance Standards & guidelines. Following documents/data has been collected from the different stakeholders are as under:-

- Demographic profile of the Village:** total population; male female ratio; total livestock; milk produce; cattle, Village boundaries; Village settlement area Rivers/drainage Existing road network with distinguished marking for various categories of roads The railway lines etc.
- Land allocated for MPCS :** details: survey no.; area of plot in (sqmt); Category of land (Pvt./Govt./Forest land); Type of Land (Ag./Abadi/comm./waste land ); Distance of the site from the Habitation (in Mt.); Connectivity of site, Road Name Main Rural Road/ State/NH (in Mt.); Distance etc.
- Distance of site from Sea/ water bodies** etc.
- Community Property Resources:** Distance of the site from Primary Health Centre; Distance of the site from Govt School & capacity; Distance of the site from Community Hall & capacity; Distance of the site from Panchayat Ghar & capacity etc.

- e. **Details of Approach Road**, Main Road & Sea/Water Bodies: Length of Approach for the site (in Mt.); Existing RoW of approach Road (in Mt.); Proposed Row of approach Road (in Mt.), Impact of Land Acquisition land & assets/CPR (if any);
- f. **Temporary Impact during construction period** (if any);
- g. **Impact due to cross drainage (CD)** structures & diversions: Due to construction of approach roads.

GSDMA has carefully selected sites for MPCS. The guiding principles used in site selection and approval include:

- a. Select government wasteland or Panchayat Land.
- b. Avoid forest land.
- c. Avoid private land.
- d. Preference is given to site with good connectivity.
- e. Flat lands are preferred.
- f. Productive lands are avoided.
- g. Land in ecologically sensitive area is avoided.
- h. Land that may cause social impact or economic impact on a group or section of villagers is not preferred.
- i. Allocation of land that caused arguments amongst villagers is avoided and alternate land is preferred.
- j. Land allocated measured from 2000 to 10,000 sq meter.

These criteria and processes lead project avoiding long processes of:

- a. Land acquisition;
- b. Forest clearance;
- c. Environment clearance;
- d. EIA and SIA;
- e. Full RAP or Rapid RAP.

However, the region being close to sea coast as prime objective is mitigate distress due to cyclone there are sites of MPCS that required CRZ clearance.

These sites fall in CRZ III being relatively undisturbed rural areas. The provisions of CRZ Notification 2011 have provision for permitting construction of rain shelter in Para 8(i)IIIA(iii)(j) in CRZ III areas. There is provision even in CRZ I areas to permit rain shelter in Para 8(i) I (ii) (c).

## 7.7 LAND ACQUISITION & IMPACTS

The National Cyclone Risk Mitigation Project (NCRMP) has adopted and exercised meticulous planning & good practices for minimizing socio-economic impacts by prioritizing MPCS on vacant & waste Government land where feasible & also Road works within existing RoW and optimization work within existing facilities' or premises.

The land use pattern in the village is hardly impacted as MPCS are being constructed on small part of government or Panchayat wasteland of the villages. The lands selected have poor productivity and contribute little to the economy of the village. Thus no impact is expected on land use pattern in the villages.

However if land acquisition is required at any stage of the project implementation then the process will be in accordance with guidelines laid in the Resettlement Framework of GSDMA & also as per existing applicable acts & laws. The land allocated for MPCS, its present use and the requirement of approach road is presented in table below.



**Format- Environmental & Social Screening**  
**National Cyclone Risk Mitigation Project-**

<b>Part-A: General Information</b>	
<b>Name of the Activity</b>	<b>Construction of Multipurpose Cyclone Shelter</b>
<b>Name of the Site</b>	
<b>Location of the Sub-project</b>	
• District	
• Taluka	
• Village	
• Survey No	
• Latitude	
• Longitude	
• Elevation above mean sea level	
<b>Size of the Sub project (approx area in Sq. m or ha/length in m or km), as relevant</b>	
• Plot Size	
• Private land	
• Government land (department)	
• Forest land	
<b>If approach road:</b> Existing Road/ Right of way: Proposed road/ right of way: Length of approach road If approach road is absent, then please provide the nearest road usable from shelter in the times of emergency and distance from the usable road to shelter in km	
Please provide details of evacuation route from settlement area to shelter. Please ensure that the route describe is usable in the time of emergency	
<b>Present land use pattern/use of land</b>	
<b>Distance of the MPCS site from sea/inland water bodies (in km)</b>	
<b>Distance of the site from Primary health center (in km)</b>	

<b>Part-A: General Information</b>				
Public Buildings in the Village/Vicinity				
<b>Number</b>	<b>Capacity (People)</b>	<b>Distance from Coast (km)</b>	<b>Latitude</b>	<b>Longitude</b>
<b>Government School</b>				
<b>Private School</b>				

<b>Community Halls</b>				
<b>Other public buildings</b>				
Has any of the above said structures utilized in the past during emergency. If yes, then please list the name of structures				
Year of last Cyclone/ flood in the area				
Number of days the area was flooded				
Any other event that led to any emergency evacuation				
Potential multipurpose use during non emergency times				
Remarks/Observations of the Assessor				
<b>Part B(1): Environmental Screening</b>				
<b>Question</b>	<b>Yes</b>	<b>No</b>	<b>Details (Name &amp; Distance from Project Site)</b>	
<b>Is the Sub Project located in whole or part within the Coastal Regulation Zone?</b>				
<b>Is the Sub-Project located in whole or part in/near any of the following environmentally sensitive area?</b>				
a) Biosphere Reserve				
b) National Park				
c) Wildlife/Bird Sanctuary				
d) Tiger or Elephant Reserve				
e) Wetland				
f) Important Bird Areas				
g) Coastal area with Coral				
h) Mangroves Areas				
i) Estuary with Mangroves				
j) Natural Lakes				
k) Swamps/Mudflats				
l) Habitant of Migratory Birds (Outside protected areas)				
m) Migratory Route of Wild Animals/Birds				

n) Area with threatened/rare/endangered fauna (Outside protected areas)			
o) Area with threatened/rare/endangered flora (Outside protected areas)			
p) Reserved/Protected Forest			
q) Zoological Park/Botanical Garden			
Is the sub project located with 500 meters from rivers, stream, estuaries or deltaic mouths?			
<b>Is the Sub-Project located in whole or part near any of the following sensitive features?</b>			
a) World Heritage Sites			
b) Archeological Monuments/sites (under ASI's Central/state list)			
c) Historic Places (Not listed under ASI-Central or State list but regionally/locally important)			
d) Reservoirs/Dams			
e) Religious Places (Regionally or Locally important)			
f) Public Water Supply areas from Rivers/Surface Water Bodies/Ground Water Sources)			
<b>Part B(2): Result of Environment Screening Exercise</b>			
1.	Environmental Impact Assessment is required		
2.	CRZ Clearance is required		
3.	Environmental Clearance is required		
4.	Forest Clearance is required		
<b>Part C(1): Social Screening</b>			
1.	Does the Sub-Project activity require acquisition of private land?		
Yes		No	No
Give following details	Private land (Sq.m/ha)		
	Govt land(Sq.m/ha)		
	Forest Land(Sq.m/ha)		
2.	Does the proposed sub project activity result in demolition /removal of existing structures		
Yes		No	
If so, give following details			
• Number of public structures/buildings			

	• Number of common property resources (Such as religious cultural/drinking water/wells/etc.)		
	• Number of private structures (located on private or public land)		
3.	Does the proposed Project activity result in loss of crops/Trees		
Yes		No	
4.	Does the proposed Project activity result in loss of livelihood/employment?		
Yes		No	
5.	Does the proposed Project activity result in loss of mangrove ecosystem/community forest on which nearby residents/local population are dependent for fuel wood/grazing etc?		
Yes		No	
If Yes, Give the details of extent of area to be lost ( in acres/hac)			
6.	Does the proposed project activity affect Schedule tribe/Caste communities		
Yes		No	
<b>Part C2): Result of Social Screening Exercise</b>			
1.	Social Impact Assessment is required		
2.	Abbreviated RAP is required		
3.	Full RAP is required		
Name of the Environmental Expert –DSC-GSDMA		:	
Name of the Social Expert –DSC-GSDMA		:	
Date of Field Visit		:	
Signature & Date		:	
Name of Expert –PMSC-GSDMA		:	
Name of GSDMA Staff/representative		:	
Designation of GSDMA Staff/ representative		:	
Signature & Date		:	
Name of Representative (I)		:	
Designation of Representative (I)		:	
Date of field Visit		:	
Signature & Date		:	
Name of Representative (II)		:	
Designation of Representative (II)		:	
Date of field Visit		:	
Signature & Date		:	
Name of Representative (III)		:	
Designation of Representative (III)		:	
Date of field Visit		:	
Signature & Date		:	

Status Report at a Glance											
National Cyclone Risk Mitigation Project (NCRMP)-II											
The Land allocated for 100 MPCS Sites											
Sl.No	Status (Awarded/ Retendered/ New Site/Under Construction)	Package No.	District	Taluka	Village/ Site MPCS	Details of allotment of land for MPCS					
						Collector Order No.	Date	Survey Nos.	Allotted Area Sqmt) (in	Category of Land	Type of Land
1	2	3	4	5	6	7	8	9	10	11	12
1	Awarded	PBR-01	Porbandar	Porbandar	Gorsar	LND/2/C/1384/2014	13/05/2014	9/4/19	5000	Govt.	Waste Land
2	Awarded		Porbandar	Porbandar	Palkhada	LND/ 25/27937/2010	17/10/2010	2/P		Govt.	Waste Land
3	Awarded		Porbandar	Porbandar	Tukda Gosa	LND/R/C/1382/2014	13/05/2014	54/1A P1	5000	Govt.	MPCS
4	Awarded	GS-06R	Gir Somnath	Kodinar	Kaj	LND/2/C/591/2009	7/3/2009	118/3/P	8094	Govt.	MPCS
5	Awarded	GS-08R	Gir Somnath	Patan Veraval	Ajotha	LND/2/C/1341/2016	17/05/2016	389/P/1	2500	Govt.	Waste Land
6	Awarded		Gir Somnath	Patan Veraval	Meghpur	LND/2/C/1372/2016	4/6/2016	347/P/3	2500	Govt.	MPCS
7	Awarded	GS-11R	Gir Somnath	Una	Simar	LND/3/C/502/2009	5/3/2009	25	10000	Govt.	MPCS
8	Awarded		Gir Somnath	Una	Saiyad Rajpara	LND/3/C/510/2009	7/3/2009	97/P,3/P	10000	Govt.	MPCS
9	Awarded	GS-13R	Gir Somnath	Una	Kalapan/ Rajput Rajpara	LND/3/C/515/2009	1/3/2009	156/P	10000	Govt.	MPCS
10	Awarded		Gir Somnath	Una	Delwada	LND/2/C/1299/2016	13/5/2016	361//P	5000	Govt.	MPCS
11	Awarded	GS-12R	Gir Somnath	Una	Kob	LND/3/C/518/2009	7/3/2009	620/P	10000	Govt.	MPCS
12	Awarded		Gir Somnath	Una	Tad	LND/3/C/503/2009	7/3/2009	497/1/P	4047	Govt.	MPCS
13	Awarded		Gir Somnath	Una	Paldi	LND/3/C/504/2009	5/3/2009	370/P	5059	Govt.	MPCS
14	Awarded	GS-21	Gir Somnath	Patan- Veraval	Bhalpara	LND/2/C/1964/2016	13/05/2016	96/P	2500	Govt.	Waste Land
15	Awarded		Gir Somnath	Patan- Veraval	Bij	LND/2/C/1940/2016	29/08/2016	446//P	2500	Govt.	Waste Land
16	Awarded	GS-23	Gir Somnath	Kodinar	Kodinar (M)	LND/3/C/596/2009	1/3/2009	1264/A/P	10000	Govt.	Waste Land
17	Awarded	GS-15	Gir Somnath	Sutrapada	Singsar	LND/2/C/592/2009	11/3/2009	20/P	4047	Govt.	MPCS
18	Awarded		Gir Somnath	Sutrapada	Vadodra (Jhala)	LND/2/C/1938/2016	29/08/2016	797/P	2500	Govt.	Waste Land
19	Awarded	GS-18R	Gir Somnath	Patan- Veraval	Vadodra Dodiya	LND/2/C/1542/2016	20/06/2016	165/P	2500	Govt.	Waste Land
20	Awarded	PBR-02R	Porbandar	Porbandar	Untda	LND/3308/2016	20/06/2016	383/P	3000	Govt.	Waste Land
21	Awarded		Porbandar	Porbandar	Balej	LND/2/C/1383/2014	22/04/2016	52/4/1	5000	Govt.	Waste Land
22	Awarded	PBR-03R	Porbandar	Porbandar	Pata	LND/1243/2016	17/06/2016	411/4/13P	1400	Govt.	Waste Land

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The Land allocated for 100 MPCs Sites											
Sl.No	Status (Awarded/ Retendered/ New Site/Under Construction)	Package No.	District	Taluka	Village/ Site MPCs	Details of allotment of land for MPCs					
						Collector Order No.	Date	Survey Nos.	Allotted Area Sqmt) (in	Category of Land	Type of Land
23	Awarded	DD-1	Devbhumi Dwarka	Kalyanpur	Gandhvi	JMN-42593-94-2011	17/12/2011	207/P20	5000	Govt.	Waste Land
24	Awarded		Devbhumi Dwarka	Kalyanpur	Gangdi	JMN-42593-94-2011	17/12/2011	180/1/P1	5000	Govt.	Waste Land
25	Awarded		Devbhumi Dwarka	Kalyanpur	Pindara	JMN-42593-94-2011	17/12/2011	336/16/P	5000	Govt.	Waste Land
26	Awarded	JND-06R	Junagadh	Mangrol	Arena	LND/2/C/2851/2016	8/10/2016	344/2	3023	Govt.	MPCS
27	Awarded		Junagadh	Mangrol	Maktupur	LND/3/C/2850/2016	5/10/2016	1/1	3000	Govt.	MPCS
28	Awarded	JND-11	Junagadh	Malia	Chorvad (M)	LND/3/C/820/2009	21-12-2009	130/1/P	4500	Govt.	MPCS
29	New Site	BR-2	Bharuch	Vagra	Kaladara	BHUMI/Vshi/4679	15/07/2017	1	5000	Govt.	Waste Land
30	New Site		Bharuch	Jambusar	Khanpor Deh	BHUMI/Vshi/3169	27/05/2009	1923	5000	Govt.	Waste Land
31	New Site	DD-2	Devbhumi Dwarka	Okhamandal	Surajkaradi (Ct)	LND/ 2/216/(10)/2016	22/06/2016	68	2500	Govt.	Waste Land
32	New Site		Devbhumi Dwarka	Okhamandal	Varavala	LND/ 2/216/(10)/2016	22/06/2016	109	5000	Govt.	Waste Land
33	New Site	JMN-1	Jamnagar	Lalpur	Singach	LND/ 4/2355/56/2011	12/12/2011	234/P	10000	Govt.	Waste Land
34	New Site		Jamnagar	Lalpur	Zankhar	LND/ 4/2355/56/2011	12/12/2011	77/P	10000	Govt.	Waste Land
35	New Site	GS-07R	Gir Somnath	Kodinar	Panadar	LND/3/C/599/2009	9/3/2009	711	5000	Govt.	Waste Land
36	New Site		Gir Somnath	Kodinar	Sarkhadi	LND/ 2/C/1350/2016	17/5/2016	516/1	5000	Govt.	Waste Land
37	New Site	GS-24	Gir Somnath	Sutrapada	Kadvar	LND/3/C/466/2009	5/3/2009	430/P	4047	Govt.	MPCS
38	New Site	GS-25	Gir Somnath	Una	Manekpur	LND/2/C/1632/2016	16/06/2016	211	2500	Govt.	Waste Land
39	New Site		Gir Somnath	Una	Navabandar	LND/2/C/1817/2016	2/8/2016	115	2500	Govt.	MPCS
40	New Site	JND-12	Junagadh	Mangrol	Dhelana	LND/3/C/1288/2017	26/05/2017	9	3000	Govt.	Waste Land
41	New Site		Junagadh	Mangrol	Sheriyaj	LND/3/C/442/2017	23/02/2017	344	3000	Govt.	MPCS
42	New Site	JND-13	Junagadh	Mangrol	Shil	LND/3/C/1445/2017	16/06/2017	612/1/A	3000	Govt.	Waste Land
43	New Site		Junagadh	Mangrol	Chandvana	LND/3/C/466/2017	21/02/2017	2	3000	Govt.	Waste Land
44	New Site	JND-07R	Junagadh	Mangrol	Divasa	LND/3/C/2852/2016	8/10/2016	191/1	2000	Govt.	Waste Land
45	New Site		Junagadh	Mangrol	Rahij	LND/3/C/2867/2016	8/10/2016	653/1	1500	Govt.	Waste Land
46	New Site	JND-14	Junagadh	Mangrol	Antroli	LND/3/C/1444/2017	12/6/2017	347	3000	Govt.	Waste Land
47	New Site		Junagadh	Mangrol	Lohej	LND/3/C/166/2017	1/2/2017	690	3000	Govt.	Waste Land
48	New Site	JND-15	Junagadh	Malia	Kukasvada	LND/3/C/737/2009	21/03/2009	466	3000	Govt.	Waste Land
49	New Site		Junagadh	Malia	Visanvel	LND/3/C/640/2017	15/03/2017	332	3000	Govt.	Waste Land
50	New Site	JND-16	Junagadh	Mangrol	Nagichana	LND/3/C/293/2017	15/02/2017	28/1	3000	Govt.	Waste Land
51	New Site	KTH-1	Kachchh	Mandvi	Maska	LND/2//4759/2016	24/06/2016	368	7000	Govt.	Waste Land
52	New Site		Kachchh	Mandvi	Mandvi (M)	LND/2//1630/2017	31/03/2017	370 (adj245/246)\	2500	Govt.	MPCS



Status Report at a Glance											
National Cyclone Risk Mitigation Project (NCRMP)-II											
The Land allocated for 100 MPCS Sites											
Sl.No	Status (Awarded/ Retendered/ New Site/Under Construction)	Package No.	District	Taluka	Village/ Site MPCS	Details of allotment of land for MPCS					
						Collector Order No.	Date	Survey Nos.	Allotted Area Sqmt) (in	Category of Land	Type of Land
53	New Site	KTH-2	Kachchh	Gandhidham	Chudva	LND/2//4185/2017	18/08/2017	243	3000	Govt.	MPCS
54	New Site		Kachchh	Gandhidham	Bharapar	LND/2//4184/2017	18/08/2017	243	3000	Govt.	Waste Land
55	New Site		Kachchh	Bhachau	Moti Chirai	LND/2//2144/2017	2/5/2017	1003/P/1adj(483)	2500	Govt.	Waste Land
56	New Site	MOR-1	Morbi	Maliya	Bodki	LND/Maliya/Miyana-31	21/01/2010	86/1	2500	Govt.	MPCS
57	New Site	NVS-1	Navsari	Jalalpore	Krushnapur	CH/LND/VSH/1750-59/16NO.14/2016	20/06/2016	1/1	2000	Govt.	MPCS
58	Retendered	AMR-01	Amreli	Jafrabad	Chitrasar	LND/1/VSH/ 5048/09	13/11/2009	135/P1	5567	Govt.	Waste Land
59	Retendered	AMR-01	Amreli	Jafrabad	Vandh	LND/1/VSH/ 5048/09	13/11/2009	25/P	4047	Govt.	MPCS
60	Retendered	GS-10R	Gir Somnath	Sutrapada	Lodhva	LND/2/C/1346/2016	19/5/2016	251/P	2000	Govt.	MPCS
61	Retendered	GS-10R	Gir Somnath	Sutrapada	Prashnavada	LND/2/C/1913/2016	2/8/2016	662/P	2000	Govt.	MPCS
62	Retendered	GS-14R	Gir Somnath	Una	Bhingrana	LND/3/C/519/2009	7/3/2009	170/P	10000	Govt.	MPCS
63	Retendered	GS-14R	Gir Somnath	Una	Olvan	LND/3/C/511/2009	5/3/2009	274/1/P	4047	Govt.	MPCS
64	Retendered	GS-15R	Gir Somnath	Una	Nandan	LND/3/C/514/2009	5/3/2009	108/P	10000	Govt.	MPCS
65	Retendered	GS-15R	Gir Somnath	Una	Jhankharvada	LND/3/C/499/2009	5/3/2009	52/1/P	5000	Govt.	MPCS
66	Retendered	GS-15R	Gir Somnath	Una	Khan	LND/2/C/1237/2016	13/05/2016	78/P	2000	Govt.	Waste Land
67	Retendered	GS-16R	Gir Somnath	Una	Senjaliya	LND/3/C/500/2009	5/7/2009	161/P	10000	Govt.	MPCS
68	Retendered	GS-16R	Gir Somnath	Una	Kheda	LND/3/C/506/2009	5/3/2009	63/P	10000	Govt.	MPCS
69	Retendered	GS-17R	Gir Somnath	Una	Dudhala	LND/3/C/509/2009	5/3/2009	44/1/A/P38/P1	4047	Govt.	MPCS
70	Retendered	GS-17R	Gir Somnath	Una	Khatriwada	LND/3/C/505/2009	5/3/2009	150/3/B	10000	Govt.	MPCS
71	Retendered	GS-20	Gir Somnath	Patan-Veraval	Chhatroda	LND/2/C/1942/2016	30/8/2016	334	1496	Govt.	MPCS
72	Retendered	GS-20	Gir Somnath	Patan-Veraval	Sonariya	LND/2/C/1353/2016	16/5/2016	33/P	2000	Govt.	Waste Land
73	Retendered	GS-22	Gir Somnath	Kodinar	Chhara	LND/3/C/590/2009	7/3/2009	696	10000	Govt.	MPCS
74	Retendered	GS-22	Gir Somnath	Kodinar	Velan	LND/3/C/587/2009	7/3/2009	384/61/P	10000	Govt.	MPCS
75	Under Construction	GS-2	Gir Somnath	Sutrapada	Matana	LND/3/C/2740/2009	27/10/2009	374	4047	Govt.	Waste Land
76	Under Construction	JND-3	Junagarh	Mangrol	Khodada	LND/3/C/739/2009	21/03/2009	88/5	2000	Govt.	Waste Land
77	Under Construction	JND-1	Junagarh	Malia	Januda	LND/3/C/642/2017	28/03/2017	25	3000	Govt.	Waste Land
78	Under				Jhunjharpur	LND/3/C/461/2017	24/03/2017	127/1	3000	Govt.	Waste Land

## Status Report at a Glance

## National Cyclone Risk Mitigation Project (NCRMP)-II

**The Land allocated for 100 MPCS Sites**

Sl.No	Status (Awarded/ Retendered/ New Site/Under Construction)	Package No.	District	Taluka	Village/ Site MPCS	Details of allotment of land for MPCS						
						Collector Order No.	Date	Survey Nos.	Allotted Area (in Sqmt)	Category of Land	Type of Land	
	Construction											
79	Completed	AMD-01	Ahmedabad	Dhandhuka	Dholera	LND/3/C/739/2009	21/03/2009	21	5000	Govt.	Waste Land	
80	Completed	BR-01	Bharuch	Hansot	Katpor	BHUMI/Vshi/3169	27/05/2009	2892	5000	Govt.	Waste Land	
81	Completed			Vagra	Rahiad	BHUMI/Vshi/3169	27/05/2009	762	5000	Govt.	Waste Land	
82	Completed			Suva	BHUMI/Vshi/3169	27/05/2009	203	5000	Govt.	Waste Land		
83	Completed	GS-04	Gir Somnath	Kodinar	Damli	LND/3/C/589/2009	07/03/2009	11/P1	10000	Govt.	Waste Land	
84	Completed			Kodinar	Kadodara	LND/2/C/377/2016	04/01/2017	478/P2	10000	Govt.	Waste Land	
85	Completed			Kodinar	Chouhan Ni Khan	LND/3/C/597/2009	07/03/2009	431/1	5000	Govt.	Waste Land	
86	Completed	GS-05		Kodinar	Pipli	LND/3/C/739/2009	21/03/2009	400	10000	Govt.	Waste Land	
87	Completed			Una	Naliya Mandavi	LND/3/C/2150/2009	15/09/2009	311/1/1/P27/P1	10000	Govt.	Waste Land	
88	Completed			Una	Khajudra	LND/2/C/1939/2016	30/08/2016	227	10000	Govt.	Waste Land	
89	Completed	GS-03		Sutrapada	Morasa	LND/2/C/1633/2016	16/06/2016	193/2	4047	Govt.	Waste Land	
90	Completed	JND-01		Junagarh	Malia	Shantipura	LND/3/C/739/2009	23/03/2009	78/1/1/1	10000	Govt.	Waste Land
91	Completed	JND-02			Mangrol	Ajak	LND/3/C/1500/2016	26/05/2016	22/1/8	2200	Govt.	Waste Land
92	Completed					Bamanvada	LND/3/C/567/2016	01/03/2016	1 pt 1	2204	Govt.	Waste Land
93	Completed		Chankhava			LND/3/C/879/2016	14/03/2016	32	2400	Govt.	Waste Land	
94	Completed	JND-03	Mangrol		Farangata	LND/3/C/876/2016	19/03/2016	144 pt 1	1900	Govt.	Waste Land	
95	Completed				Kankasa	LND/3/C/579/2016	01/03/2016	1 pt	1800	Govt.	Waste Land	
96	Completed	JND-04	Mangrol		Nandarkhi	LND/3/C/580/2016	03/03/2016	237 pt 1	2856	Govt.	Waste Land	
97	Completed				Sangavada	LND/3/C/875/2016	19/03/2016	131/3	1980	Govt.	Waste Land	
98	Completed				Talodra	LND/3/C/878/2016	19/03/2016	206/1/pt3	2100	Govt.	Waste Land	
99	Completed				Zariyavada	LND/3/C/875/2016	19/03/2016	127 pt 1	2030	Govt.	Waste Land	
100	Completed	JND-10		Malia	Khambhaliya	LND/3/C/575/2009	07/03/2009	305/pt/1	10000	Govt.	Waste Land	

## 7.8 ECOLOGICALLY SENSITIVE AREA IN VICINITY OF MPCS SITES

The MPCS sites were examined for their proximity to ecologically sensitive areas and monuments & importance and not found ecologically sensitive area in vicinity of MPCS sites although, the coastal region of Gujarat state is on Central Asian Flyway of migratory birds. The wetlands of Gujarat and the farmlands in coastal region are places for wintering for migratory birds. The coastal region of Ahmedabad and Bhavnagar districts are recognized as Important Bird Area (IBA) by the Bombay Natural History Society (BNHS).

## 7.9 CLEARANCE NEEDED

The land allocated for the MPCS are less not more than 1ha. The lands allocated from revenue wastelands or Panchayat lands. These lands are largely vacant lands that are non-productive. Only few MPCS sites have trees. Many sites have Prosopis juliflora bushes. No land has been allotted from forestland or wildlife sanctuaries. Thus only regulatory permissions needed for construction on the allocated MPCS sites are for CRZ clearance and cutting of trees in few cases. Table - 7.3 gives list of sites that need CRZ clearance. R&B department was helped to prepare CRZ proposals for submission to department of Forest and Environment by the Environment Expert of the PMSC team. Mandatory maps were obtained from Space Application Centre, Indian Space Research Organization, Ahmedabad (SAC, ISRO). The summary of findings of Environment and Social Screening are detailed in table 8.3.

Table 7.3 : List of CRZ Permission for MPCS sites				
Sl.No	District	Taluka	MPCS site Village	Remarks
1	Bharuch	Jambusar	Khanpor Deh	Approval in 38th Meeting of GCZMA dated 30-10-2017
2	Devbhumi Dwarka	Kalyanpur	Gandhvi	Approval in 38th Meeting of GCZMA dated 30-10-2017
3	Gir Somnath	Una	Saiyad Rajpara	Approval in 30th Meeting of GCZMA dated 23-06-2016
4	Gir Somnath	Una	Tad	Approval in 30th Meeting of GCZMA dated 23-06-2016
5	Gir Somnath	Una	Paldi	Approval in 30th Meeting of GCZMA dated 23-06-2016
6	Gir Somnath	Una	Olvan	Approval in 30th Meeting of GCZMA dated 23-06-2016
7	Gir Somnath	Una	Bhingrana	Approval in 30th Meeting of GCZMA dated 23-06-2016
8	Gir Somnath	Una	Jhankharvada	Approval in 30th Meeting of GCZMA dated 23-06-2016
9	Gir Somnath	Una	Nandan	Approval in 30th Meeting of GCZMA dated 23-06-2016
10	Gir Somnath	Una	Senjaliya	Approval in 30th Meeting of GCZMA dated 23-06-2016
11	Gir Somnath	Una	Kheda	Approval in 30th Meeting of GCZMA dated 23-06-2016
12	Gir Somnath	Una	Khatriwada	Approval in 30th Meeting of GCZMA dated 23-06-2016
13	Gir Somnath	Una	Dudhala	Approval in 30th Meeting of GCZMA dated 23-06-2016
14	Gir Somnath	Sutrapada	Vadodra (Jhala)	Approval in 38th Meeting of GCZMA dated 30-10-2017
15	Gir Somnath	Kodinar	Velan	Approval in 38th Meeting of GCZMA dated 30-10-2017
16	Gir Somnath	Kodinar	Sarkhadi	Approval in 38th Meeting of GCZMA dated 30-10-2017
17	Gir Somnath	Sutrapada	Kadvar	Approval in 36th Meeting of GCZMA dated 19-07-2017
18	Gir Somnath	Una	Manekpur	Approval in 38th Meeting of GCZMA dated 30-10-2017
19	Gir Somnath	Una	Navabandar	Approval in 38th Meeting of GCZMA dated 30-10-2017
20	Navsari	Jalalpore	Krushnapur	Under approval from GCZMA
21	Porbandar	Porbandar	Tukda Gosa	Approval in 30th Meeting of GCZMA dated 23-06-2016

## 7.10 PROJECT ROADS

NCRMP provided for construction of roads in cyclone prone area to provide for improved connectivity. These roads will facilitate necessary lifesaving supplies during distress and help evacuation if needed. In normal times improved connectivity shall contribute to social and economic development of the villages and increased income and social well-being of the people inhabiting these villages.

Accordingly roads were selected in the coastal region of Gujarat. While there is significant network of roads available in Gujarat need is felt to widen, strengthen and improve roads in cyclone prone area so that communication is not hampered during period of distress.

### 7.11 NCRMP ROAD DETAILS

In eight districts 43 roads have been selected for development under NCRMP. These are existing village roads with most of them being Ashphalt concrete roads commonly referred to as Black Top (BT) roads with width varying between 3 m to 3.75 m. NCRMP provided for widening and strengthening the selected roads with provision of adequate safeguards considering the probability of flood and cyclone in the region. This was subsequently reconsidered for the roads that are in CRZ area. It was decided that in the sensitive CRZ area the road may not be widened but only strengthened. A report was submitted to the Department of Forest and Environment, Government of Gujarat in this regard indicating the intention of the GSDMA to only strengthen the roads in CRZ area and not to widen the roads. The Gujarat Coastal Zone Management Authority (GCZMA) observed in its 28th meeting held on 22nd April, 2016

“The Authority (GCZMA) deliberated the proposals of Road and Building Panchayat Department and after detailed discussion, it is decided to issue CRZ clearances for upgradation/widening of existing roads as proposed by M/S Road & Building Panchayat Department (only on submission of the CRZ maps from Space Application Centre, Ahmedabad) with some specific conditions. Accordingly, the Road and Building Panchayat Department were requested to submit the necessary CRZ maps so that necessary clearance can be issued.

The GSDMA vide its letter dated 17-02-2016 informed that now they have decided not to widen the roads as proposed and only strengthened and in such cases, CRZ would not requires.

The Authority deliberates the proposal and decided since, the Road and Building and Panchayat Department is not going to widen the road, they do not require CRZ Clearance.”

Accordingly the GSDMA revised the plans for existing BT roads in CRZ area to be only strengthened. However, the roads that were Kutcha Cart roads in CRZ area permission was obtained from the GCZMA for making asphalt road of appropriate dimensions. The roads that are beyond the CRZ area are being widened and strengthened. Table – 7.4 gives list of road their status and indicates their location with reference CRZ area.

**Table – 7.4 NCRMP Roads - Status – Location**

Sr. No	Taluka	Road Name	Length km	Present status of road	n CRZ
District Ahmedabad					
1	Dholera	Navagam Karnan Approach Road	5.5	BT road	Yes
2		Rahtalav Mahadevpura Bhangadha Road	11.1	BT road	Yes
3		Burhanpur Approach Road	3.15	BT road	Yes
4	Dholera	Kamatav Approach Road	4.58	BT road	No
5		Mingalpur (Navagam) Zankhi Road	2.15	BT road	No
6		Gogala Approach Road	2.65	BT road	No
District Anand					
7	Anand	Vadgam Approach Road	0.55	BT road	No
8		Pandad Vainaj Road	3.5	BT road	No
District Bharuch					
9	Hansot	Vamleshwar Ankalva Aniyadra Dhmrud Sunevkhard Road	14.71	3.75m BT road	Yes
10		Badodra Katasayan Road	2.78	3.75 m BT road	Yes
11		Dantrai Approach Road	1.8	3.75 m BT road	Yes
12		Utraj Approach Road	0.57	BT road	Yes
13		Vaghvan Ankalva Road	3.26	Kutcha road	Yes
14		Vaghvan Chhiludra Road	1.24	3.75m BT road	Yes
15	Jambusar	Chhidra Malpur Road	8	Kutcha Cart road	Yes
16		Zamani Ishanpur Road	4.5	3m BT road	Yes
17	Jambusar	Kalk Khanpur Deh Road	6	Part BT part earthen road	Yes partly

Sr. No	Taluka	Road Name	Length km	Present status of road	n CRZ
18	Jambusar	Bakarpur Timbi Road	2.46	3m BT road	No
19		Madarfar Kansagar Road	6	3.75m BT road	No
20		Kava vad Panch Pipala Chandpur Bara Road	8.2	3.75m BT road	No
21	Jambusar	Runad Dahegam Road	12.55	10.15km BT road & 2.4km Kutcha road	No
22		Sardarpura Approach Road	2.2	3.75 m BT road	No
23		Waseta Approach Road	0.8	3.75 m BT road	No
24	Vagra	Eksaal Kesrol Road	1.47	3m BT road	No
25		Atali Akhod Road	3.8	3m BT road	No
26		Manad Kesrol Approach Road	4.26	WBM road	No
27		Atali Koliad Road	3.36	3m BT road	No
28	Bharuch	Kasva Samani Approach Road	1.7	3m BT road	Yes
29		Vaadva Vesardra Vasi Chaulad Road	2.7	3m BT road	Yes
District Bhavnagar					
30	Bhavnagar	Narmad Approach Road	2.6	3.5 m BT road	No
31	Bhavnagar	Adhelai Jashvantpur Road	8.75	3m BT road	Yes partly
District Kutch					
32	Bhuj	Bambhadai Approach Road	1.2	3m BT road	No
District Navsari					
33	Jalalpore	Chormala Bhatha Kaniyet Kankra Road	1.67	BT road	Yes
34		Dandi Dargah Road	1.2	BT road	Yes
35		Delvada Village Road	1.19	3m BT road	Yes
36		Nimlai Village Road	1.2	3m BT road	Yes
District Surat					
37	Olpad	Mor Approach Road	1.4	3.75m BT road	Yes
38		Kapasi Approach Road	2.4	3.75m BT road	Yes
39		Thothab Approach Road	1.2	3.75m BT road	Yes
40	Choryasi	Bhesan Malgama Road	2.3	3.75 m BT road	No
41	Olpad	Mindhi Approach Road	1	3.75m BT road	No
42	Olpad	Paradi Zakhari Kamroli Road	3.4	3.75m BT road	No
District Valsad					
43	Valsad	Dandi Bhagal Road	3	3 m BT road	Yes

Note :

1. No forest land is proposed to be used for the NCRMP roads. Therefore, forest clearance is not needed for any of the roads.
2. The roads proposed under NCRMP are village roads only. Therefore, no EC is required.
3. No new land is allocated for land development. The length of roads being less than 20 km and in many cases less than 5 km. No RAP or SIA is proposed.

## 7.12 ECOLOGICALLY SENSITIVE AREA IN VICINITY OF NCRMP ROADS

The NCRMP roads were examined for their proximity to ecologically sensitive areas and monuments of importance as detailed in para 7.2.g. The coastal region of Gujarat state is on Central Asian Flyway of migratory birds. The wetlands of Gujarat and the farmlands in coastal region are places for wintering for migratory birds. The coastal region of Ahmedabad and Bhavnagar districts are recognized as Important Bird Area (IBA) by the Bombay Natural History Society (BNHS). Table – 8.5 presents the observations regarding ecologically sensitive area monuments in vicinity of the NCRMP roads.

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National Cyclone Risk Mitigation Project (NCRMP)-II												
Construction of Road & Bridges for Multipurpose Community Shelters (MPCS) in the State of Gujrat												
Sl. No	Package No	District	Taluk	Total Roads	Name of Road	Length of Road (in KM)	Category of Road	Ecologically Sensitive Areas & Monuments in vicinity				
								CRZ required (Yes/No)	EC required (Yes/No)	Forest Area	Eco sensitive area	Monuments/ Religious places
1	2	3	4	5	6	7	8	9	10	11	12	13
1	AHD-01	Ahemedabad	Dholera	3	Navaggam Karman Approach Road	5.5	BT road	Yes	No, Village Road	No	1. Located in (IBA). 2. Located in deltaic region of Bhadar river.	
2					Rahtalav Mahadevpura Bhandha Road	11.1	BT road	Yes	No, Village Road	No	1. Located in IBA. 2. Located in wetland region.	
3					Burhanpur Approach Road	3.15	BT road	Yes	No, Village Road	No	1. Located in IBA. 2. Located in deltaic region of Bhogav river.	
4	AHD-02	Ahemedabad	Dholera	3	Kamatav Approach Road	4.58	BT road	No	No, Village Road	No	1. Located in Important Bird & Biodiversity Area (IBA).	
5					Mingalpur (Navagam) Zankhi Road	2.15	BT road	No	No, Village Road	No	1. Located in IBA. 2. Located in wetland region.	
6					Gogala Approach Road	2.65	BT road	No	No, Village Road	No	1. Located in Important Bird & Biodiversity Area (IBA).	
7	AND-01	Anand	Anand	2	Vadgam Approach Road	0.55	BT road	No	No, Village Road	No	1. Road passes by side of village pond. 2.Mangrove area is about 4km from road. 3.Flamingo are known to congregate for wintering at a spot about 4km from road. 4.Road is near to Sabarmati river deltaic region >500m.	1. Localy revered Sikoter mata temple about 4.2km from road.
8					Pandad Vainaj Road	3.5	BT road	No	No, Village Road	No	1. Flamingo congregate for wintering at a spot about 10 km from road.	
9	BRH-01	Bharuch	Jambusar	2	Chhidra Malpur Road	8	Kutch Cart road	Yes	No, Village Road	No	1. Village pond at villages Anklav, Damrod and Aniyadra are near to road. 2.Narmada river is near to road at Vamleshwar village.	Temple of Vamleshwar village is at road end in the village.
10					Zamani Ishanpur Road	4.5	3m BT road	Yes	No, Village Road	No	1. Village ponds at Katsayan and Badodra end are close	



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### National Cyclone Risk Mitigation Project (NCRMP)-II

### Construction of Road & Bridges for Multipurpose Community Shelters (MPCS) in the State of Gujrat

Sl. No	Package No	District	Taluk	Total Roads	Name of Road	Length of Road (in KM)	Category of Road	Ecologically Sensitive Areas & Monuments in vicinity				
								CRZ required (Yes/No)	EC required (Yes/No)	Forest Area	Eco sensitive area	Monuments/ Religious places
											to road. 2. A stream/river is near to road and during high tide water reaches upto road.	
11	BRH-02	Bharuch	Jambusar	1	Kalk Khanpur Deh Road	6	Part BT part earthen road	Yes	No, Village Road	No	1. Village ponds at villages Dantrai and Chilodra are near to road. 2. Creek is about 200m.	
12	BRH-03	Bharuch	Bharuch	2	Kasva Samani Approach Road	1.7	3m BT road	Yes	No, Village Road	No	1. Village pond at Utraj is near road. 2. It is in deltaic region of river Narmada. Tidal water reaches within 500m of road.	
13					Vaadva Vesardra Vasi Chaulad Road	2.7	3m BT road	Yes	No, Village Road	No	1. It is in wetland region. 2. Village pond at Anklav is near to road.	
14	BRH-4	Bharuch	Vagra	4	Eksaal Kesrol Road	1.47	3m BT road	No	No, Village Road	No	1. Village ponds of Chilodra and Vaghvan are near to road. 2. High tide water reaches within 500 m of the road.	
15					Atali Akhod Road	3.8	3m BT road	No	No, Village Road	No	1. Village ponds at Chidra and Malpur are near to road. 2. Road region is flood prone.	
16					Manad Kesrol Approach Road	4.26	WBM road	No	No, Village Road	No	1. Village pond at Zamdi is near road. 2. At Ishanpur village located at coast sparse low mangrove are observed.	
17					Atali Koliad Road	3.36	3m BT road	No	No, Village Road	No	1. Creek water causes flooding in parts of road.	
18	BRH-05	Bharuch	Jambusar	3	Bakarpor Timbi Road	2.46	3m BT road	No	No, Village Road	No	-	

## Status Report at a Glance

### National Cyclone Risk Mitigation Project (NCRMP)-II

### Construction of Road & Bridges for Multipurpose Community Shelters (MPCS) in the State of Gujrat

Sl. No	Package No	District	Taluk	Total Roads	Name of Road	Length of Road (in KM)	Category of Road	Ecologically Sensitive Areas & Monuments in vicinity				
								CRZ required (Yes/No)	EC required (Yes/No)	Forest Area	Eco sensitive area	Monuments/ Religious places
19					Madarfar Kansagar Road	6	3.75m BT road	No	No, Village Road	No	1. Village ponds at Sindhar, Kansagar and Madarfar are near to road.	
20					Kava vad Panch Pipala Chandpur Bara Road	8.2	3.75m BT road	No	No, Village Road	No	1. Village ponds at Kava, Vad, Panch Pipla and Chandpur Bara are near to road.	
21	BRH-06	Bharuch	Jambusar	3	Runad Dahegam Road	12.55	10.15km BT road & 2.4km Kutcha road	No	No, Village Road	No	1. Village ponds at Dahegam, Gulal, Kantharia and Runad are near to road. 2. Flamingo congregate in inter-tidal region at about 10km from road.	
22					Sardarpura Approach Road	2.2	3.75 m BT road	No	No, Village Road	No	-	
23					Waseta Approach Road	0.8	3.75 m BT road	No	No, Village Road	No	-	
24	BRH-07	Bharuch	Honsot	6	Vamleshwar Ankalva Aniyadra Dhmrud Sunevkhard Road	14.71	3.75m BT road	Yes	No, Village Road	No	1. Eksal village pond is near to road at Eksal end.	
25					Badodra Katasayan Road	2.78	3.75 m BT road	Yes	No, Village Road	No	1. Village ponds at Atali and Akhod are near to road.	
26					Dantrai Approach Road	1.8	3.75 m BT road	Yes	No, Village Road	No	-	
27					Utraj Approach Road	0.57	BT road	Yes	No, Village Road	No	-	
28					Vaghvan Ankalva Road	3.26	Kutcha road	Yes	No, Village Road	No	1. Deltaic region of river Narmada is close to road at village Samni. 2. Village pond at Samni is near to road.	
29					Vaghvan Chhiludra Road	1.24	3.75m BT road	Yes	No, Village Road	No	1. Narmada river deltaic region is close to Vadva end of road.	

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National Cyclone Risk Mitigation Project (NCRMP)-II													
Construction of Road & Bridges for Multipurpose Community Shelters (MPCS) in the State of Gujrat													
Sl. No	Package No	District	Taluk	Total Roads	Name of Road	Length of Road (in KM)	Category of Road	Ecologically Sensitive Areas & Monuments in vicinity					
								CRZ required (Yes/No)	EC required (Yes/No)	Forest Area	Eco sensitive area	Monuments/ Religious places	
30	BHV-01	Bhavnagar	Bhavnagar	1	Adhelai Jashvantpur Road	8.75	3m BT road	Yes	No, Village Road	No	1. Located in IBA.		
31	BHV-08	Bhavnagar	Bhavnagar	1	Narmad Approach Road	2.6	3.5 m BT road	No	No, Village Road	No	1. Road is about 3km from Velavadar Balckbuck National Park. 2. It is located in IBA. 3. Tidal water is observed on side (towards sea) of road for part length (4.5 to 6km). 4. Part of road sometimes get flooded.		
32	KCH-03	Kutchh	Bhuj	1	Bambhadai Approach Road	1.2	3m BT road	No	No, Village Road	No	1. The village pond at Bhambhdai is close to road.		
33	NVS-01	Navasari	Jalalpore	4	Chormala Bhatha Kaniyet Kankra Road	1.67	BT road	Yes	No, Village Road	No	1. Tidal water reaches upto road side.		
34					Dandi Dargah Road	1.2	BT road	Yes	No, Village Road	No	1. Mangroves at 3 km.	1. Safi Villa, where Mahatma Gandhi stayed during Dandi March is ASI protectd monument. 2. Dawoodi Bohra Dargah at Dandi of local importance.	
35					Delvada Village Road	1.19	3m BT road	Yes	No, Village Road	No	1. Deltaic region of Poorna river is close to road at Delvada end. 2. Road region is flood prone.		
36					Nimlai Village Road	1.2	3m BT road	Yes	No, Village Road	No	-		
37	SRT-01	Surat	Olpad	3	Mor Approach Road	1.4	3.75m BT road	Yes	No, Village Road	No	1. Sparse low Mangrove patch observed on creek edge about 500m from road.		

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Construction of Road & Bridges for Multipurpose Community Shelters (MPCS) in the State of Gujrat												
Sl. No	Package No	District	Taluk	Total Roads	Name of Road	Length of Road (in KM	Category of Road	Ecologically Sensitive Areas & Monuments in vicinity				
								CRZ required (Yes/No)	EC required (Yes/No)	Forest Area	Eco sensitive area	Monuments/ Religious places
38					Kapasi Approach Road	2.4	3.75m BT road	Yes	No, Village Road	No	1. Sena creek water reaches close to village end of the road during high tide.	
39					Thothab Approach Road	1.2	3.75m BT road	Yes	No, Village Road	No	-	
40	SRT-02	Surat	Choryasi	3	Bhesan Malgama Road	2.3	3.75 m BT road	No	No, Village Road	No	1. Some parts of roads get flooded during rains for short time.	
41			Olpad		Mindhi Approach Road	1	3.75m BT road	No	No, Village Road	No	1. Village pond is by side of road.	
42					Paradi Zakhari Kamroli Road	3.4	3.75m BT road	No	No, Village Road	No	1. Kamroli lake is by the side of road at Kamroli end of the road. 2.Part of road gets flooded.	
43	VLD-01	Valsad		1	Dandi Bhagal Road	3	3 m BT road	Yes	No, Village Road	No	-	

Note:

1. The coastal region of Gujarat is on Central Asian Flyway of migratory birds. Therefore, common observation for the area is – **“The entire coastal region of Gujarat falls on the central Asian Flyway of migratory birds.”**
2. Wetlands of Gujarat being on Central Asian Flyway are known to be wintering grounds for migratory birds. The farm lands and grass lands of Gujarat host large number of Cranes and other migratory birds during winter.

### 7.13 CLEARANCE NEEDED

The NCRMP roads are existing roads, though the character and width of these roads vary. Since the roads are recognized existing roads the land required for roads is available as road land. There is no requirement to acquire land for road development for the project roads. These being village roads the roadsides are not notified as forests. Therefore, FCA clearance is not required for any of the roadwork in the project.

The GSDMA being aware of concerns in CRZ area restricted the road development work to strengthening the existing roads without widening of existing BT roads. However, the Kutcha Cart roads in CRZ required regulatory permission under CRZ for up gradation to BT road. R&B department was helped to prepare CRZ proposals for submission to department of Forest and Environment by the Environment Expert of the PMSC team. Mandatory maps were obtained from Space Application Centre, Indian Space Research Organization, Ahmedabad (SAC, ISRO).

There are few trees along roadsides of some of the roads. There are *Prosopis juliflora* bushes on road shoulders and side of some of the roads. No permission is required for clearing *Prosopis juliflora* bushes. As the alignment of road was yet to be firmed when the roads was visited for Environment and Social screening the number of trees that will have to be felled could not be ascertained. However, the local R&B officials were made aware of need to restrict the number of trees to be felled to minimum. The local officials will finalize the list of trees that may have to be felled and obtain permission of competent authority after finalizing the alignment on site.

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## **Chapter 8: Environmental and Social impacts and Mitigation measures**

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### **8.1 SOIL, TOPOGRAPHY & GEOLOGY**

The MPCS sites are plain terrain. There would not be any significant impact on the overall relief of the region. Little impact is anticipated on soils in the locale. There may be site specific loss of topsoil due to digging for borrow pit to meet soil needs for approach roads and filling and digging of foundations. No impact on geology is anticipated due to construction of MPCS & approach roads except requirement of construction materials, which would be availed from approved quarry sites located nearby. Thus:

#### **Impacts**

- Disfiguration of topography due to indiscriminate digging of borrow pit.
- Uncontrolled digging of borrow pit resulting in water accumulation & breeding of vector disease.
- Disturbance on geological setting due to quarrying.

#### **Mitigation Measures:**

- Uncontrolled digging of borrow pits will be avoided to prevent water accumulation in abandoned pits which acts as breeding ground of disease vectors (mosquitoes). The borrow pit site will be identified in consultation with local community and approved by the Dy Executive Engineer.
- Construction materials will be procured from existing approved and licensed quarries only where crusher is already operating. Therefore, mitigation measures for the environmental impacts due to quarrying and rehabilitation plan of the quarries is the responsibility and in the scope of the license holder of the quarry which is duty bound to for it.
- Suitable seismic design will be adopted to mitigate the earthquake impacts in future.
- Guidelines for rehabilitation of Borrow and Quarry Areas are provided in Annex G.

### **8.2 DRAINAGE & HYDROLOGY**

Any impact/ interference with the natural drainage of MPCS site, the area that may bear the impact of construction of MPCS and approach road and the area down the natural course of drainage due to the structure of the MPCS or in the process of construction may have unintended consequences on the environment in the region. These impacts may include:

- Hindered flow of water upstream the course of drainage.
- Collection of water in depressions.
- Hindering natural drainage in the village leading to collection of wastewater/polluted water in village drains leading to breeding of mosquitoes and spread of water borne diseases.

It could also be caused due soil filling in campus for landscape management of the MPCS site or the careless disposal of the debris, construction waste and remains. Care has been taken to select the project sites in such a manner that it does not affect the natural flow of water or the drainage pattern of the area.

#### **Mitigation Measures:**

- Filling of existing drainage courses will be strictly avoided during construction and site clearance;
- Adequate cross drainage (CD) structures will be provided for smooth passage of runoff to avoid flooding & formation of water pool;
- Suitable drainage at construction site & camp will be provided to eliminate the chances of formation of stagnant water pools that may lead to soil erosion & breeding of mosquitoes.

### **8.3 WATER USE**

#### **Impacts**

- Short term Impact on the local water sources and/or availability of water to local population due to use of construction water.

#### **Mitigation Measures**

- Minimum use of water from existing sources for construction purpose will be ensured to minimize likely impacts on other users;
-



- Water will be sourced after taking permission from the concerned authorities;
- Community will be consulted wherever community sources are used.

#### **8.4 WATER QUALITY**

Small quantity of water will be used in the compaction during construction process. Wastewater from construction activities would mostly contain suspended impurities. Other pollutants that may be caused and find their way into the drainage system or collect as pool of polluted water causing nuisance to local people will be of insignificant concentrations and may be safely disregarded. The deterioration of surface water quality during construction phase is expected due to wastewater disposal from the worker's camp and sullage generated from construction sites. If adequate arrangements are not made to ensure proper drainage of wastewater from the construction sites, such water may form stagnant pools and aggravate soil erosion or pollute the nearby surface water body. Stagnant pools of water promote breeding of mosquitoes and create generally unsanitary conditions.

##### **Impacts:**

- Increase of sediment load in the run off from construction sites and increase in turbidity in receiving streams/ surface water bodies.
- Water pollution due to sewage from construction camps

##### **Mitigation Measures:**

- Quality of construction wastewater emanating from the construction site will be controlled through suitable drainage system with sediment traps for arresting the silt/sediment load before its disposal into the main natural drainage system around the site;
- Proper sanitation facilities will be provided at the construction site to prevent health related problems due water contamination;
- All the construction and preparatory activities including construction of culverts will be carried out during dry seasons only.

#### **8.5 AIR QUALITY**

Particulate matter would be the predominant pollutant affecting the air quality during the construction period, as it is likely to generate dust, especially during dry weather conditions. Dust will be generated mainly during excavation, backfilling, loading/ unloading & transportation of construction materials, spilling of material during transportation, hauling & transportation of material through unpaved roads, and open storage of fine construction materials. Automobile traffic due to movement of vehicles for construction purposes and construction machinery may cause undesirable gaseous pollution. Operation of concrete batching plant will cause emission of fumes and gases.

##### **Impacts:**

- Deterioration of air quality due to fugitive dusts emission from construction activities like excavation, backfilling & concreting, and hauling & dumping of earth materials & construction spoils, and vehicular movement along unpaved roads.
- Deterioration of air quality due to gaseous emissions from construction equipment.
- Deterioration of air quality due to emission from concrete batching plant.

##### **Mitigation Measures:**

- Proper and prior planning and appropriate sequencing and scheduling of all major construction activities will be done, and timely availability of infrastructural supports needed for construction will be ensured to shorten the construction period vis a vis reduce pollution;
  - Construction materials will be stored away from habitation in a manner to minimize the windblown fugitive emissions;
  - Truck carrying construction materials will be duly covered to avoid spilling;
  - Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads & vulnerable areas of the construction sites from trucks or other suitable means will be undertaken to control fugitive dust during material handling & hauling activities particularly near habitation especially in the dry seasons;
-

- Low emission construction equipment, vehicles and generator sets will be used;
- It will be ensured that all the construction equipment & vehicles are in good working condition, properly tuned and maintained to keep emissions within the permissible limits and engines turned off when not in use to reduce pollution;
- Concrete batching plant will be located at least 500 m away from inhabited areas.

## 8.6 NOISE LEVEL

### Impacts:

- There may be increase in noise level due to construction activities like operation of construction equipment & vehicular traffic.

### Mitigation Measures:

- It will be ensured that all the construction equipment & vehicles used are in good working condition, properly lubricated & maintained to keep noise within the permissible limits and engines turned off when not in use to reduce noise;
- Construction activities carried out near residential area will be scheduled to the daytime only so that minimum disturbances are caused to people;
- Construction camp will be located away from the immediate vicinity of the habitation;
- Protective gears such as earplugs etc. will be provided to construction personnel exposed to high noise levels as preventive measure.

## 8.7 FLORA & FAUNA

### Impacts

- There may some loss of trees due to cutting of trees at MPCS construction site and/or approach road. The lands allocated for MPCS construction have few trees with *Prosopis juliflora* occupying many sites. No rare or endangered floral species are reported from MPCS sites.
- Migratory birds are common in region of most of the MPCS village. There may be some loss of habitat for them. However, the land allocated for MPCS are small fraction of available habitat for the migratory birds and local avifauna in the region and may not have any significant impact on overall availability of habitat for the avifauna in the region.
- The MPCS are largely vacant lands not put to any use. Locally occurring fauna may inhabit some of these sites. There may be loss of habitat to the local fauna that may inhabit the construction site. However, no endangered fauna is reported from the MPCS sites.
- The route for migration of some of the fauna may be hindered due to the structure. There are reports of movement of Asiatic lion in some of the villages in which MPCS are being constructed. Asiatic lion are reported from wooded outskirts of the villages. The land allocated for MPCS is small fraction of vacant land of the village that too mostly away from where the wooded areas that are reportedly frequented by Asiatic lion.

### Mitigation Measures

- The MPCS campus will be planted with adequate number of trees of local species. This will more than compensate for the loss of trees that may have to be felled.
  - Impacts on fauna are not expected to be significant. No rare or endangered fauna will be adversely affected. The fauna that may inhabit the MPCS site is likely to migrate to available vacant lands in the region.
  - The drainage lines will be protected/ conserved as the local fauna use drainage lines for safe migration and often find food in the moist environment of the drainage lines. Cross drainage will be provided wherever needed. This will help mitigate any adverse impact on local hydrology as well protect migration route for local fauna.
-

## 8.8 SOLID WASTE

Solid waste will be generated in labour camps and construction debris and remnants of construction material at construction camp and construction site.

### Impacts:

- Leaving construction debris and remnants of construction material at construction camp or construction site or improper disposal of the same could cause obstruction in drainage channels and unknown adverse impact on local environment and nuisance to local community.
- Improper disposal of domestic waste from labour camps may cause unhygienic conditions locally.

### Mitigation Measures

- Site clearance will be emphasized and certified by appropriate authorities on completion of the construction.
- The small amount of construction debris will be disposed of in suitable pre-identified or existing dumping areas in tune with the local condition to avoid land degradation & water logging due to indiscriminate dumping.
- Regular inspection of haul roads, construction site & camp will be carried out to ensure regular and timely removal of construction debris to the dumping sites.
- Domestic as well as the sanitary wastes from construction camp will be cleared regularly. It will be disposed hygienically at appropriate preselected site.
- Dumping areas will be biologically reclaimed through topsoil cover.
- Proper sanitation facilities will be provided at the construction site to prevent health related problems due water contamination.

## 8.9 LABOUR CAMP

### Impacts:

- Influx of construction work force & supplier who are likely to construct temporary tents in the vicinity.
- Likely sanitation & health hazards & other impacts on the surrounding environment due to inflow of construction labourers.

### Mitigation Measures:

- Temporary construction camps at designated & demarcated sites with adequate sanitation, drinking water supply & primary health facilities.
- Most of the construction work is labour intensive. As most of the job will be done through contractors, it will be ensured that the contractor provides the workers with adequate amenities, health & sanitation facilities in the camp. Such facilities shall include potable water supply, sanitary facilities (such as dry pit latrines), solid waste collection & disposal system and primary health facilities (such as first aid facilities) etc.
- It will be ensured through contract agreement that the construction workers are provided fuel for cooking to avoid cutting of trees for fuel wood from the adjoining areas.
- Domestic as well as the sanitary wastes from construction camp will be cleared regularly.

## 8.10. SAFETY ASPECTS

### Impacts:

- Health & safety related problems to construction workers due to inadequate health & safety measures.

### Mitigation Measures:

- Contractor will be required make adequate safety measures complying with the occupational safety manual to prevent accidents/hazards to the construction workers.
  - The contractor will be required to arrange for periodic health check-up of construction workers.
-

### 8.11 EMPLOYMENT & TRADING OPPORTUNITIES

Construction of MPCs will create trading and employment opportunities in the village and adjoining village/town with market.

Construction work being labour intensive will create employment opportunities for local people for the period of construction. This will add to the income of local people and also opportunity to improve their skills. It may also cause influx of labour from other villages. The labour from other villages will need to procure essentials for day-to-day needs that will generate opportunity for local shopkeepers.

The construction materials like stone chips and sand will be procured locally from identified quarry sites. The other construction materials like cement, iron rod, brick, steel etc. will be procured through various local sources. Thus there is a possibility of generation of local employment & trading opportunities, though temporary.

### 8.12 IMPACTS OF ROADS AND MITIGATION MEASURES

The anticipated environment and social impacts of construction of project roads and the mitigation or management inputs are detailed here.

### 8.13 LAND USE

The roads to be constructed are existing roads. The land to be used for construction of project roads is already assigned and identified as land for road. Only two of the roads are Kaccha cart roads whereas two others are part BT and part Kaccha roads. Rest all the roads are BT roads. The land for Kaccha roads too is assigned road land. There is no change of use land use due to construction of roads under the project.

### 8.14 SOIL, TOPOGRAPHY AND GEOLOGY

Little impact is anticipated on Soil, Topography and Geology in the road width area due to construction of roads. The soil on Kaccha roads will be impacted by the conversion to BT road. However, the road strip is already used for traffic. Therefore, impact in the road width will be little consequence. However, there will be significant impact on soil in the borrow pit area. There may be impact on the geology and topography due to requirement of construction materials, which would be availed from approved quarry sites located nearby.

#### Impact

- Disfiguration of topography due to indiscriminate digging of borrow pit.
- Uncontrolled digging of borrow pit resulting in water accumulation & breeding of vector disease.
- Disturbance on geological setting due to quarrying.

#### Mitigation Measures:

- Uncontrolled digging of borrow pits will be avoided to prevent water accumulation in abandoned pits which acts as breeding ground of disease vectors (mosquitoes). The borrow pit site will be identified in consultation with local community and approved by the Dy Executive Engineer.
- Construction materials will be procured from existing approved and licensed quarries only where crusher is already operating. Therefore, mitigation measures for the environmental impacts due to quarrying and rehabilitation plan of the quarries is the responsibility and scope of the license holder of the quarry.
- Suitable seismic design will be adopted to mitigate the earthquake impacts in future.
- Guidelines for rehabilitation of Borrow and Quarry Areas are provided.

### 8.15 DRAINAGE & HYDROLOGY

Road construction that includes strengthening and widening may have significant impact on drainage and hydrology of the region. This could be of high significance in flat areas in coastal region.

#### Impacts

- Hindered flow of water in drainage channels due to road embankment.
  - Movement of tidal water in the region may be obstructed due to road embankment.
-

- Collection of water in depressions.
- Hindering natural drainage in the village leading to collection of waste water/polluted water in village drains leading to breeding of mosquitoes and spread of water borne diseases.
- Improper disposal of construction debris and remnant material may obstruct the drainage.

#### **Mitigation Measures**

Design considerations of road ensured minimum impact on hydrology of the region. This ensured both the road safety and minimization of impact on the environment of the region.

- Cross drain of appropriate size will be provided at all the drainage points.
- The roads in the CRZ area will be only be strengthened and not widened.
- Special cross drains will be provided to facilitate movement of tidal waters after studying the topography of the region and movement of tidal water.
- Special care in selection of borrow pit site. This includes consultation with local community and the Dy. Executive Engineer.
- The borrow pit will be rehabilitated with utmost care as per prescribed procedure.
- Suitable drainage at construction site & camp will be provided to eliminate the chances of formation of stagnant water pools that leads to soil erosion & breeding of mosquitoes.

### **8.16 WATER USE**

#### **Impacts**

- Short term Impact on the local water sources and/or availability of water to local population due to use of construction water.

#### **Mitigation Measures**

- Minimum use of water from existing sources for construction purpose will be ensured to minimize likely impacts on other users;
- Water will be sourced after taking permission from the concerned authorities;
- Community will be consulted wherever community sources are used.

### **8.17 WATER QUALITY**

Main use of water will be in the compaction during construction process. Wastewater from construction activities would be little and mostly contain suspended impurities. The modern methods of road construction involve sourcing various grades of water bound and hot mix from established plants. This reduces site-specific water requirement and creation of wastewater to minimum. The plants are operated with due safeguards prescribed by the Gujarat Pollution Control Board (GPCB). GPCB monitors the plants for control of pollution. Other pollutants that may be caused and find their way into the drainage system or collect as pool of polluted water causing nuisance to local people will be in insignificant concentrations and may be safely disregarded. The deterioration of surface water quality during construction phase is expected due to wastewater disposal from the workers camp and sillage generated from construction sites. If adequate arrangements are not made to ensure proper drainage of wastewater from the construction sites, such waters may form stagnant pools and aggravate soil erosion or pollute the nearby surface water body. Stagnant pools of water promote breeding of mosquitoes and create generally unsanitary conditions.

#### **Impacts:**

- Increase of sediment load in the run off from construction sites and increase in turbidity in receiving streams/ surface water bodies.
- Water pollution due to sewage from construction camps

#### **Mitigation Measures:**

- Quality of construction wastewater emanating from the construction site will be controlled through suitable drainage system with sediment traps for arresting the silt/sediment load before its disposal into the main natural drainage system around the site;
  - Proper sanitation facilities will be provided at the construction site to prevent health related problems due water contamination;
-

- All the construction and preparatory activities including construction of culverts will be carried out during dry seasons only.

### **8.18 AIR QUALITY**

Particulate matter would be the predominant pollutant affecting the air quality during the construction period, as it is likely to generate dust, especially during dry weather conditions. Dust will be generated mainly during excavation, backfilling, loading/ unloading & transportation of construction materials, spilling of material during transportation, hauling & transportation of material through unpaved roads, and open storage of fine construction materials. Automobile traffic due to movement of vehicles for construction purposes and construction machinery may cause undesirable gaseous pollution. The water bound mixes and hot bitumen mix will be obtained from approved plants set up for the purpose away from habitation. These plants operate with permission from GPCB and are required to meet standards prescribed by GPCB. These plants are monitored by GPCB. There will be some concrete requirement for CD works. Operation of concrete batching plant will cause emission of fumes and gases.

#### **Impacts:**

- Deterioration of air quality due to fugitive dusts emission from construction activities like excavation, backfilling & concreting, and hauling & dumping of materials & construction spoils, and vehicular movement along unpaved roads
- Deterioration of air quality due to gaseous emissions from construction equipment
- Deterioration of air quality due to emission from concrete batching plant

#### **Mitigation Measures:**

- Proper and prior planning and appropriate sequencing and scheduling of all major construction activities will be done, and timely availability of infrastructural supports needed for construction will be ensured to shorten the construction period to reduce pollution.
- Construction materials will be stored away from habitation in a manner to minimize the wind blown fugitive emissions.
- Truck carrying construction materials will be duly covered to avoid spilling.
- Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads & vulnerable areas of the construction sites from trucks or other suitable means will be undertaken to control fugitive dust during material handling & hauling activities particularly near habitation especially in the dry seasons.
- Low emission construction equipment, vehicles and generator sets will be used.
- It will be ensured that all the construction equipment & vehicles are in good working condition, properly tuned and maintained to keep emissions within the permissible limits and engines turned off when not in use to reduce pollution.

### **8.19 NOISE LEVEL**

#### **Impacts:**

- There may be increase in noise level due to construction activities like operation of construction equipment & vehicular traffic.

#### **Mitigation Measures:**

- It will be ensured that all the construction equipment & vehicles used are in good working condition, properly lubricated & maintained to keep noise within the permissible limits and engines turned off when not in use to reduce noise.
  - Construction activities carried out near residential area will be scheduled to the daytime only so that minimum disturbances are caused to people.
  - Construction camp will be located away from the immediate vicinity of the habitation.
  - Protective gears such as earplugs etc. will be provided to construction personnel exposed to high noise levels as preventive measure.
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- Wet and hot mixes will be obtained from GPCB approved plants that are located away from habitation and are monitored for noise and other pollution.

## 8.20 FLORA & FAUNA

### Impacts

- There may some loss of trees due to need to cut some existing trees along the roads wherever road is to be widened. Some bushes mainly of *Prosopis juliflora* may have to be cleared from sides to provide embankment and clearing of inlet and outlet for CD works. No rare or endangered floral species are reported.
- Migratory birds are common in region of most of the roads. There may be some loss of habitat for them. The impact on available habitat for the migratory birds and local avifauna in the region may not be significant if the hydrology of the region is conserved. There may not be any impact on movement of avifauna in the region.
- The strengthening of roads may increase traffic on these roads. The habitat for the local fauna may be impacted in two ways-
  - The habitat may be divided with local fauna specially reptiles and small fauna finding it inconvenient to travel across roads. Thus movement routes of some of the species may be restricted. In such situation microhabitat variation that such species enjoy in various seasons may be adversely affected. This may impact food availability in various seasons also.
  - Any impact on local hydrology may have pronounced impact on habitat for fauna in the region. In the coastal region the salinity gradient in the water and moisture in the subsoil is critical to the variation in flora. Any impact on nutrient, moisture regime, salinity, pH will have impact on flora. This will affect food chain and fauna in the region. It is difficult to anticipate, describe or quantify such micro impacts. It is best to ensure that there are no such impacts.

However, no endangered fauna is reported from the MPCS sites.

### Mitigation Measures

- There will be planting of trees of locally occurring species along the road after completion of road construction work. This will more than compensate for loss of trees that may have to be cut due to road development.
- The drainage lines will be protected/ conserved as the local fauna use drainage lines for safe migration and often find food in the moist environment of the drainage lines. Cross drainage will be provided wherever needed. This will help mitigate any adverse impact on local hydrology as well protect migration route for local fauna. This will ensure that the microenvironment in the region does not change and the food chain is not impacted.

## 8.21 SOLID WASTE

Solid waste will be generated in labour camps and construction debris and remnants of construction material at construction camp and construction site.

### Impacts:

- Leaving construction debris and remnants of construction material at construction camp or construction site or improper disposal of the same could cause obstruction in drainage channels and unknown adverse impact on local environment and nuisance to local community.
- Improper disposal domestic waste from labour camps causes unhygienic conditions locally.

### Mitigation Measures

- Site clearance will be emphasized and certified by appropriate authorities on completion of the construction.
  - The small amount of construction debris will be disposed of in suitable pre-identified or existing dumping areas in tune with the local condition to avoid land degradation & water logging due to indiscriminate
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dumping.

- Regular inspection of haul roads, construction sites & camp will be carried out to ensure regular and timely removal of construction debris to the dumping sites.
- Domestic as well as the sanitary wastes from construction camp will be cleared regularly. It will be disposed hygienically at appropriate preselected site.
- Dumping areas will be biologically reclaimed through topsoil cover.
- Proper sanitation facilities will be provided at the construction site to prevent health related problems due water contamination.

## **8.22 LABOUR CAMP**

### **Impacts:**

- Influx of construction work-force & suppliers who are likely to construct temporary tents in vicinity of the road being constructed.
- Likely sanitation & health hazards and other impacts on the surrounding environment due to inflow of construction labourers.

### **Mitigation Measures:**

- Temporary labor camps at designated & demarcated sites with adequate sanitation, drinking water supply & primary health facilities.
- Most of the construction work is labour intensive. As most of the job will be done through contractors, it will be ensured that the contractor provides the workers with adequate amenities, health & sanitation facilities in the camp. Such facilities shall include potable water supply, sanitary facilities (such as dry pit latrines), solid waste collection & disposal system and primary health facilities (such as first aid facilities) etc.
- It will be ensured through contract agreement that the construction workers are provided fuel for cooking to avoid cutting of trees for fuel wood from the adjoining areas.
- Domestic as well as the sanitary wastes from construction camp will be cleared regularly.

## **8.23 SAFETY ASPECTS**

### **Impacts:**

- Health & safety related problems of construction workers due to inadequate health & safety measures.
- Health safety aspect of local people due to fugitive dust emission.
- Accident hazard during road construction due to inadequate signage and/or lack of proper diversion.
- Accident hazard on road completion due to inadequate signage.

### **Mitigation Measures:**

- Contractor will be required make adequate safety measures complying with the occupational safety manual to prevent accidents/hazards to the construction workers.
- The contractor will be required to arrange for periodic health check-up of construction workers.
- Contractor shall be required to adequate diversion with appropriate signage during construction.
- Caution sign for road under construction and barrier for risky area for deep cut area will be provided.
- Road signage as per standard practice will be provided for road constructed under project to help local people drive safely.

## **8.24 EMPLOYMENT & TRADING OPPORTUNITIES**

### **During construction**

Road construction will create trading and employment opportunities in the village and adjoining village/town with market during construction period. Construction work being labour intensive will create employment opportunities for local people for the period of construction. This will add to the income of local people and also opportunity to improve their skills. It may also cause influx of labour from other villages. The labour from other villages will need to procure essentials for day-to-day needs that will generate opportunity for local shopkeepers.

The construction materials like stone chips and sand will be procured locally from identified quarry sites. The other construction materials like cement, iron rod, brick, steel etc. mainly for CD works will be procured from

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various local sources. Thus there is a possibility of generation of local employment & trading opportunities, though temporary.

#### **After road construction**

Improved communication facilities for the village will enhance trade and business in the region. The local people will have easy access to markets for their produce and may earn more from their produce. At the same time it will be easy for the traders to reach the villages with their produce. Local people with increased incomes will be able to procure more goodies at competitive prices with the improved communication facility. The villagers will also have better access to health and educational facilities available in the region. The net impact will be improved living conditions for village inhabitants.

#### **8.25 CONCLUSION**

NCRMP aims to provide infrastructure that will provide succor at times of cyclone, flood, storm surge & other disasters in the coastal areas of Gujarat. It will provide for disaster relief infrastructure that includes shelter to homeless at times of disaster and network of roads that will facilitate relief supplies. The road network will also be useful for evacuation required due to disaster. NCRMP also provides for strengthening capacity for disaster preparedness. The MPCS shall be center for raising awareness for disaster preparedness. This will help increase receptivity and capacity of the vulnerable community. The MPCS will be center of socio-cultural activities of the community during normal times, there will be positive social impact in imbibing courage, self-confidence and solidarity among the local community. This will also help to increase the economic activity in the locality. The MPCS and the roads will contribute to socio economic wellbeing in the locality. Aesthetic beauty of the proposed sites & approach roads will be enhanced due to plantation in the campus of MPCS and roadsides. This will add to recreation opportunities/infrastructure in the villages. No negative impact of the MPCS and the road network is expected.

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## ***Chapter 9: Institutional Arrangement:***

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### **9.1 STATE PROJECT IMPLEMENTATION UNIT (SPIU):**

The Gujarat State Disaster Management Authority (GSDMA) is the State Project Implementation Unit of the National Cyclone Risk Mitigation Project (NCRMP) II. The SPIU is headed by Principal Secretary and Chief Executive Officer (CEO).

### **9.2 LINE DEPARTMENT:**

The Line Department has also set up state –level R&B (State): Implementing Agency for MPCS and R&B (Panchayat): Implementing Agency for Access Roads

### **9.3 PROJECT MANAGEMENT SUPPORT CONSULTANT (PMS):**

The SPIU is assisted by Project Management Support Consultant (PMS) who is providing program management support, monitoring of project timelines, assistance with bid management, cash flow and budget monitoring and stakeholder management.

### **9.4 R&B STATE:**

Implementing Agency (IA) for MPCS is being assisted by Design and Supervision Consultants (DSCs), who are designing the infrastructure, managing tendering Contractors and supervising the construction process. Construction Contractors (CC) has been appointed to build elements of the infrastructure.

### **9.5 R&B PANCHAYAT:**

Implementing Agency (IA) for approach roads is being assisted by Design and Supervision Consultants (DSCs), who are designing the infrastructure, managing tendering Contractors and supervising the construction process. Construction Contractors (CC) has been appointed to build elements of the infrastructure.

### **9.6 DESIGN & SUPERVISION CONSULTANT (DSC):**

To support the timely implementation of the project GSDMA has recruited the Design and Supervision Consultant for providing on ground support to the implementing agencies for construction of 100 MPCS in 11 districts and 43 Roads in 08 districts. The DSC has Environment and Social Safeguard Expert who are working closely with the PMS and is responsible for compliance of Environmental Management Plan (EMP), updating existing Social Safeguard Issues as mentioned in ESMF and Resettlement Framework of GSDMA, updating the Resettlement Action Plan (RAP), preparing new Resettlement Action Plan (RAP) for future subprojects, and also support in monitoring and grievance redressal mechanism.

### **9.7 CYCLONE SHELTER MANAGEMENT & MAINTENANCE COMMITTEE (CSMMC) OF MPCS:**

- Basic aim of CSMMC to manage and maintain the Multi - Purpose Cyclone Shelter (MPCS) constructed by Gujarat State Disaster Management Authority (GSDMA) as a caretaker of the community asset on behalf of GSDMA and the community
  - To ensure lawful use of the building. Endeavour to use for revenue generation through activities under the scope of the GR,
  - To establish and maintain relation with field level officials of different departments of the Government, VDMC members and NGOs for better preparedness and management of activities during disaster.
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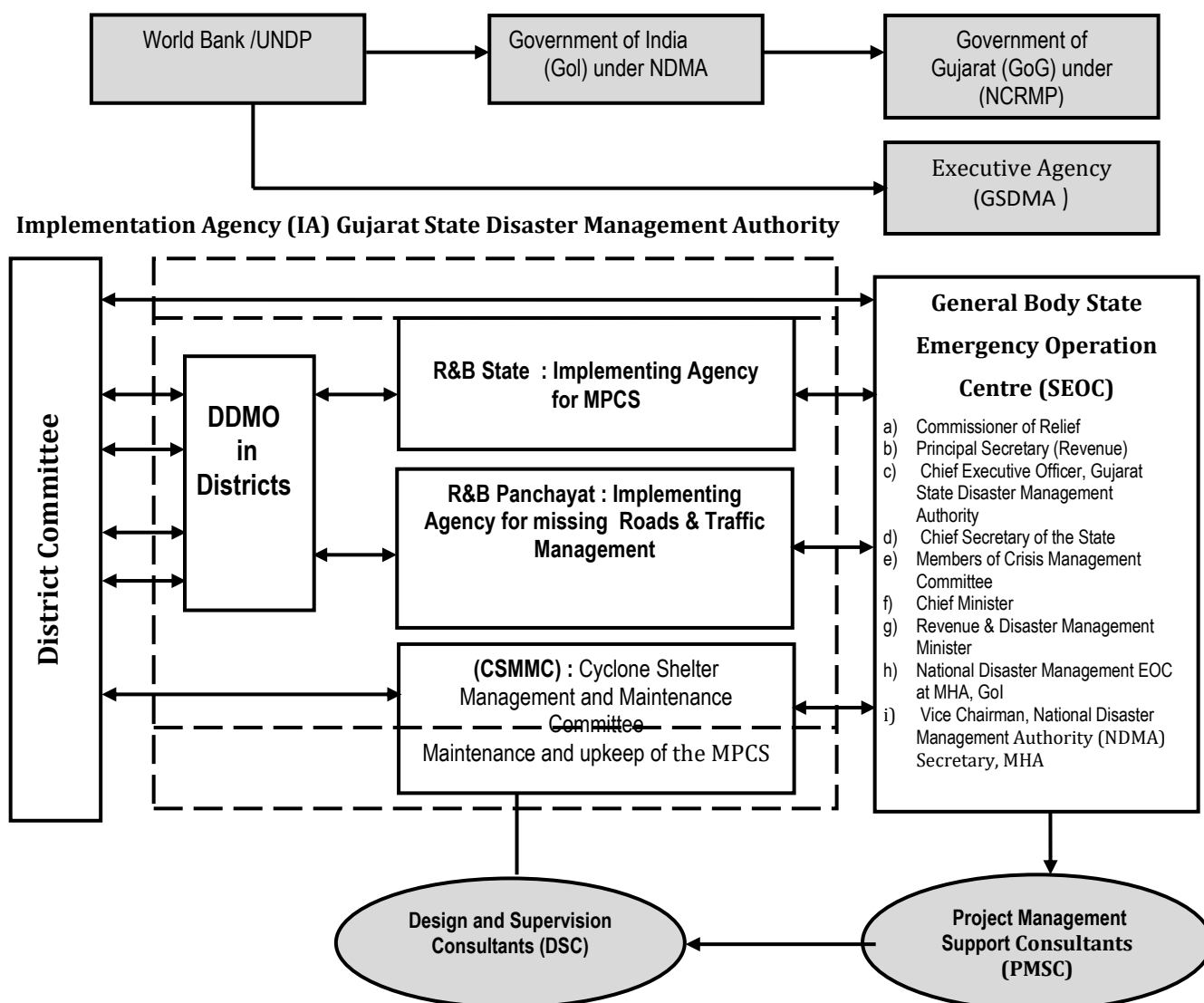
## 9.8 GRIEVANCE REDRESSAL MECHANISM

Grievance redressal mechanism is an important aspect in projects involving land development. The redressal of grievance is important to avoid unnecessary legal delays and cost overrun of the project. Also, this is a forum for people to express their dissatisfaction over environmental pollution from construction or operation activities, compensation and R&R provisions

Grievance Redressal Committee (GRC) shall be constituted within the PIU to monitor and review the progress of implementation of the EMP / ESMP and rehabilitation and resettlement plan for the affected families. The GRC shall also carry out post implementation environmental and social audits wherever EMP / ESMP / resettlement activities are to be undertaken. The committee shall include the following members:

- |                                       |          |
|---------------------------------------|----------|
| ○ Subject divisional Magistrate (SDM) | Chairman |
| ○ Mamlatdar (concern Taluka)          | Member   |
| ○ Mamlatdar (Disaster)                | Member   |
| ○ Concern Thane                       | Member   |
| ○ Member R & B                        | Member   |
| ○ Taluka Development officer          | Member   |
| ○ Village talati                      | Member   |

### Organizational Chart of GSDMA



# **Chapter 10 : Environment Management Plan**

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## **10.1 ENVIRONMENT MANAGEMENT PLAN (EMP)**

The project works of MPCS and roads shall add to available limited infrastructure at village level. In context of landscape the works are small and do not make changes in overall environment of the region. Therefore, there will be no adverse impact on environment in the region on completion of the project works. The infrastructure added to the villages and the region shall have significant positive contribution to environment and social wellbeing of the village. There is need to provide for management of the dispersed infrastructure to keep it available at times of distress for which it is meant.

There are environment and social concerns during construction phase that need be addressed. Therefore, it is necessary that the concerns be systematically addressed. Accordingly it is proposed to have EMP that will ensure that the environment is not damaged and local community is not impacted adversely during construction phase by any social addition/interaction.

EMP that incorporates the actions to minimize and neutralize the adverse impacts with do's and don'ts is provided for this purpose. The EMP envisages the plans for the proper implementation of management measures to reduce the adverse impacts arising out of the project activities. The contractor will be required to abide by the various provision of the EMP. Model EMP for MPCS and road construction work is attached at Annex- C & D respectively. It includes measures to mitigate:

- Environment impacts both locally and in the entire region of impact that includes construction areas and areas from where material are sourced,
- Social concerns,
- Labour welfare,
- Health of the workers and the community; and
- Safety of the workers and the community.

There is effort to delegate power for various site-specific approvals like selection of site for labour camp, construction camp, borrow pit site, sourcing of water, etc. to field level authorities with due community consultation. The supervising authorities are thus made responsible for the EMP.

## **10.2 EMP MONITORING**

To be effective any action plan needs to be monitored periodically. EMP is to be reported upon at beginning of work and quarterly thereafter and on completion finally. There are specific provisions that are required to be reported at beginning and those that are to be reported periodically. There are provisions that are to be reported at completion only. EMP monitoring formats for MPCS and road construction works are attached at Annex – E & F.

## **10.3 TEMPORARY WORKS:**

The Contractor shall make sure that all equipment and safeguards required for the construction work such as temporary stair, ladder, ramp, scaffold, hoist, run away, barricade, chute, lift, etc. are substantially constructed and erected, so as not to create any unsafe situation for the workmen using them or the workmen and general public passing under, on or near them.

## **10.4 HEALTH AND SAFETY:**

All contractors shall be responsible to:

- Maintain standards of Health and Safety towards all of his employees not less than those laid down by the national standards or statutory regulations.
  - Ensure that all of its workers entering the worksite comply with the Occupational Health and Safety Guidelines. The Contractor shall provide all appropriate protective clothing and equipment for the work to be done and ensure its proper use. Where required, the contractor shall provide safety nets, belts, harnesses and lines. The "safety directives for work equipment" and "safety directives for protective gears", as specified in the Occupational Health and Safety Guidelines shall be followed.
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- Provide and maintain in prominent and well-marked positions all necessary first-aid equipment, medical supplies and other related facilities. A sufficient number of trained personnel will be required to be available at all times to render first aid.
- Provide or ensure that appropriate safety and/or health signs are in place at their work sites where hazards cannot be avoided or reduced.
- Ensure that the construction vehicular traffic and movement of equipment is undertaken considering the safety of residents along the access roads. Prepare traffic management plans for ensuring safety of the residents and allow necessary cross over points for local traffic to avoid conflict points and accidents. At points of unavoidable conflicts and blind curves, safety during construction should be ensured through flagmen
- Report to the Engineer promptly and in writing particulars of any accident or unusual or unforeseen occurrences on the site, whether these are likely to affect progress of the work or not.
- Undertake Safety Orientation prior to working at the work-site.
- Unless otherwise agreed to in writing by the PIU Project Contact Person, supply all necessary equipment and tools, including but is not limited to ladders, scuffles, man-lifts, forklifts, and others required in completing the work.
- Ensure that all equipment and tools used on the work-site are in good working condition, properly maintained.
- Ensure that equipment is operated only by those workers who have been properly trained and are skilled in the operation of the equipment.
- Have available for reference, a manufacturer's operating manual for all the equipment and tools brought to the work-site.
- Use appropriate authorization to facilitate access to the project site as permitted.
- Ensure good accommodation, water supply and sanitation facilities for all workers.

#### **10.5 DISPOSAL AND POLLUTION:**

- The Contractor shall not dispose any waste, rubbish or offensive matter in any place not approved by the Engineer or Statutory Authority having jurisdiction. The Contractor shall not discharge into any watercourse oil, solids, noxious or floating materials.
- The Contractor shall take all reasonable precautions to keep public or private roads clean of any spillage or droppings from his vehicles or equipment. Any spillage or droppings which accrue shall be cleaned without delay to the satisfaction of the Engineer.
- The Contractor shall construct sanitary latrine or septic tank system or install portable cabin toilet for disposal of human waste in the site office and temporary labour sheds for workers / employees; the Contractor shall provide waste bins / cans for collection of solid waste at appropriate locations (as directed by the Engineer), and ensure proper transfer / disposal of solid waste.

#### **10.6 COMPLIANCE ON SAFEGUARD ISSUES**

##### **Safety Checklists & guidelines during Construction of MPCS & Roads**

The following checklists may help us & take steps to avoid hazards that cause injuries, illnesses and fatalities. As always, be cautious and seek help if you are concerned about a potential hazard.

##### **Note:**

- ***No Child labour/employee under 14 years old is allowed to enter in the construction site.***
  - ***No Entry without PPE, including safety jacket in the construction site.***
  - ***Proper barricading of the construction site with traffic management plans.***
  - ***Smoking should be prohibited in inflammable areas like dumping of diesel, petrol kerosene, gas cylinder etc.***
  - ***Licensed & appropriate trained driver should be allowed to operate the vehicle like Crane, Derricks & Forklift etc .***
  - ***Trained Supervisor/safety staff & guards should be deployed for close supervision of construction site.***
-

## **1. Personal Protective Equipment (PPE)**

### **a) Eye and Face Protection**

- Safety glasses or face shields are worn anytime work operations can cause foreign objects getting into the eye such as during welding, cutting, grinding, nailing (or when working with concrete and/or harmful chemicals or when exposed to flying particles).
- Welding glass for protection of radiation during welding.
- Eye and face protectors are selected based on anticipated hazards.
- Safety glasses or face shields are worn when exposed to any electrical hazards including work on energized electrical systems.

### **b) Foot Protection**

- Construction workers should wear work shoes or boots with slip-resistant and puncture-resistant soles.
- Safety-toed footwear is worn to prevent crushed toes when working around heavy equipment or falling objects.

### **c) Hand Protection**

- Gloves should fit snugly.
- Workers wear the right gloves for the job (for example, heavy-duty rubber gloves for concrete work, welding gloves for welding, insulated gloves and sleeves when exposed to electrical hazards).

### **d) Head Protection**

- Workers shall wear hard hats where there is a potential for objects falling from above, bumps to their heads from fixed objects, or of accidental head contact with electrical hazards.
- Hard hats are routinely inspected for dents, cracks or deterioration & expiry date.
- Hard hats are replaced after a heavy blow or electrical shock.
- Hard hats are maintained in good condition.

## **2. Scaffolding**

- Scaffolds should be set on sound footing.
- Damaged parts that affect the strength of the scaffold are taken out of service.
- Scaffolds are not altered.
- All scaffolds should be fully planked.
- Scaffolds are not moved horizontally while workers are on them unless they are designed to be mobile and workers have been trained in the proper procedures.
- Employees are not permitted to work on scaffolds when covered with oil, grease or other slippery materials.
- Scaffolds are not erected or moved within 10 feet of power lines.
- Employees are not permitted to work on scaffolds in bad weather or high winds unless a competent person has determined that it is safe to do so.
- Ladders, boxes, barrels, buckets or other makeshift platforms are not used to raise work height.
- Extra material is not allowed to build up on scaffold platforms.
- Scaffolds should not be loaded with more weight than they were designed to support.

## **3. Electrical Safety**

- Work on new and existing energized (hot) electrical circuits is prohibited until all power is shut off and grounds are attached.
  - An effective Lockout/Tagout system is in place.
  - Frayed, damaged or worn electrical cords or cables are promptly replaced.
  - All extension cords have grounding prongs.
  - Protect flexible cords and cables from damage. Sharp corners and projections should be avoided.
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- Use extension cord sets used with portable electric tools and appliances that are the three-wire type and designed for hard or extra-hard service. (Take precaution imprinted on the casing of item)
- All electrical tools and equipment are maintained in safe condition and checked regularly for defects and taken out of service if a defect is found.
- Do not bypass any protective system or device designed to protect employees from contact with electrical energy.
- Overhead electrical power lines are located and identified.
- Ensure that ladders, scaffolds, equipment or materials never come within 10 feet of electrical power lines.
- All electrical tools must be properly grounded unless they are of the double insulated type.
- Multiple plug adapters are prohibited.

#### **4. Floor and Wall Openings**

- Floor openings (12 inches or more) are guarded by a secured cover, a guardrail or equivalent on all sides (except at entrances to stairways).
- Toe boards are installed around the edges of permanent floor openings (where persons may pass below the opening).

#### **5. Elevated Surfaces**

- Signs are posted, when appropriate, showing the elevated surface load capacity.
- Surfaces elevated more than 48 inches above the floor or ground have standard guardrails.
- All elevated surfaces (beneath which people or machinery could be exposed to falling objects) have standard 4-inch toe boards.
- A permanent means of entry and exit with handrails is provided to elevated storage and work surfaces.
- Material is piled, stacked or racked in a way that prevents it from tipping, falling, collapsing, rolling or spreading.

#### **6. Hazard Communication**

- A list of hazardous substances used in the workplace is maintained and readily available at the worksite.
- There is a written hazard communication program addressing Material Safety Data Sheets (MSDS), labeling and employee training.
- Each container of a hazardous substance (vats, bottles, storage tanks) is labeled with product identity and a hazard warning(s) (communicating the specific health hazards and physical hazards).
- Material Safety Data Sheets are readily available at all times for each hazardous substance used.
- There is an effective employee training program for hazardous substances.

#### **7. Crane Safety**

- Cranes and derricks are restricted from operating within 10 feet of any electrical power line.
  - The upper rotating structure supporting the boom and materials being handled is provided with an electrical ground while working near energized transmitter towers.
  - Rated load capacities, operating speed and instructions are posted and visible to the operator.
  - Cranes are equipped with a load chart.
  - The operator understands and uses the load chart.
  - The operator can determine the angle and length of the crane boom at all times.
  - Crane machinery and other rigging equipment is inspected daily prior to use to make sure that it is in good condition.
  - Accessible areas within the crane's swing radius are barricaded.
  - Tag lines are used to prevent dangerous swing or spin of materials when raised or lowered by a crane or derrick.
  - Illustrations of hand signals to crane and derrick operators are posted on the job site.
  - The signal person uses correct signals for the crane operator to follow.
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- Crane outriggers are extended when required.
- Crane platforms and walkways have antiskid surfaces.
- Broken, worn or damaged wire rope is removed from service.
- Guardrails, hand holds and steps are provided for safe and easy access to and from all areas of the crane.
- Load testing reports/certifications are available.
- Tower crane mast bolts are properly torqued to the manufacturer's specifications.
- Overload limits are tested and correctly set.
- The maximum acceptable load and the last test results are posted on the crane.
- Initial and annual inspections of all hoisting and rigging equipment are performed and reports are maintained.
- Only properly trained and qualified operators are allowed to work with hoisting and rigging equipment.
- Back gear Horn and Back Light should be properly work during operation of Crane or Derricks in reverse gear.

## **8. Forklifts**

- Forklift truck operators are competent to operate these vehicles safely as demonstrated by their successful completion of training and evaluation.
- No employee under 18 years old is allowed to operate a forklift.
- Forklifts are inspected daily for proper condition of brakes, horns, steering, forks and tires.
- Powered industrial trucks (forklifts) meet the design and construction requirements.
- Written approval from the truck manufacturer is obtained for any modification or additions which affect capacity and safe operation of the vehicle.
- Capacity, operation and maintenance instruction plates, tags or decals are changed to indicate any modifications or additions to the vehicle.
- Battery charging is conducted in areas specifically designated for that purpose.
- Material handling equipment is provided for handling batteries, including conveyors, overhead hoists or equivalent devices.
- Reinstalled batteries are properly positioned and secured in the truck.
- Smoking is prohibited in battery charging areas.
- Precautions are taken to prevent open flames, sparks or electric arcs in battery charging areas.
- Refresher training is provided and an evaluation is conducted whenever a forklift operator has been observed operating the vehicle in an unsafe manner and when an operator is assigned to drive a different type of truck.
- Load and forks are fully lowered, controls neutralized, power shut off and brakes set when a powered industrial truck is left unattended.
- There is sufficient headroom for the forklift and operator under overhead installations, lights, pipes, sprinkler systems, etc.
- Overhead guards are in place to protect the operator against falling objects.
- Trucks are operated at a safe speed.
- All loads are kept stable, safely arranged and fit within the rated capacity of the truck.
- Unsafe and defective trucks are removed from service.

## Format -EMP Monitoring MPCS

Sr.No	EMP requirement		Compliance to be given by contractor
I.	Name of Village/Taluka/District		
II.	R & B site in charge Name/Designation/Phone No/Email		
III.	Contractor Project manager/Site in charge/ Contact details/Email		
IV.	Permissions required (Permission to be given by the Dy Ex Engg at the beginning)		
	1	Setting up of construction camp	
	2	Setting-up of plants and equipment	
V.	Labor camp Management		
	1	Separate toilet facility for men and women	
	2	If common mess then space for same	
	3	Fuel for cooking provided (to be arranged by the contractor)	
	4	Provision of potable water(Potable water to be provided @ 40 lpcd)	
VI.	Preservation of top soil		
	1	Top soil from areas of cutting and to be permanently covered to be removed and stored (At end of first quarter)	
	2	Top soil restored to MPCS compound and used for plantation. (At project completion.)	

Sr.No	EMP requirement		Compliance to be given by contractor		
VII.	Sourcing of Quarry material	Material	Quantity sourced	Name/ site of quarry	Approval/licence (number, date and period of validity)
	1				
	2				
	3				
VIII.	Construction water (If using ground water, permission from CGWB should be available)				
	1	Permission obtained			
	2	Original source of water			
IX.	Provision of wind barriers or screens in the downwind direction at air pollution causing sources like plant sites and fine material storage stock yards.  Dust control measures				
X.	Ensure wastewater generated during construction does not enter into streams, water bodies or the irrigation system.				
XI.	Construction debris to be disposed of in suitable pre-identified or existing dumping areas in tune with the local conditions. (Dy Ex Engg to approve dumping site.)				



## Format -EMP Monitoring Roads & Bridges

Sr.No	EMP requirement			Compliance to be given by contractor
I.	R & B site in charge Name/Designation/Address/Email/Mobile No			
II.	Contractor Name/Designation/Address/Email/Mobile No			
III.	Other permissions (Permission to be given by the Dy EX Engg at the beginning)			
	1	Setting up of construction camp		
	2	Setting-up of plants and equipment		
	3	Permission of GPCB to setup plants		
		a. Stone crusher		
		b. Hot mix		
		c. any other		
	5	Borrow area		
	6	Material stock yard (Stock register to be maintained by the contractor)	Quantity	Site details
		a.		
		b.		
		c.		
		d.		
IV.	Labor camp site			
	1	Separate toilet facility for men and women		
	2	If common mess then space for same		
	3	Fuel for cooking provided (To be arranged by the contractor.)		
	4	Provision of potable water(Potable water to be provided @ 40 lpcd.)		
	5	Fire safety provision		
V.	Protection of property and resources (In case of damage due to construction activity, the Contractor to carry out the restoration/repairs.)			

Sr.No	EMP requirement			Compliance to be given by contractor
	1	Water supply lines		
	2	Irrigation canals		
	3	Cart Cattle or foot tracks		
	4	Religious sites and cultural properties		
	5	Houses, Farmlands, Pastures, Orchards and/or Trees		
VI.	Slope stability	Ensure slope stability of near water bodies is not damaged due to construction activity		
VII.	Sourcing of Quarry material	Material	Quantity sourced	Name/ site of quarry
	1	Stone		
	2	Concrete		
	3	Sand		
	4	Other 1		
	5	Other 2		
	6	Other 3		
VIII.	Source of water  Permission obtained Yes/No			
IX.	Traffic safety & Management			
	1	Traffic diversions, if required, must comply with standards prescribed with adequate signage's and information dissemination to locals.		
	2	Traffic safety during construction		
X.	Air Pollution			
	1	Provision of wind barriers or screens in the downwind direction at air pollution causing sources like plant sites and fine material storage stock yards		
	2	PUC available for vehicles used on site		
XI.	Water pollution			

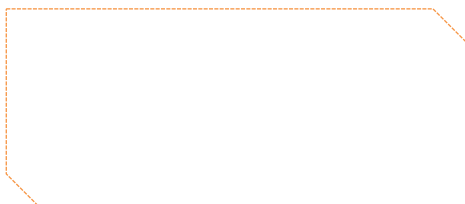
Sr.No	EMP requirement		Compliance to be given by contractor
	1	Ensure no sediment run off takes place.	
	2	Ensure there is no adversely impact on water bodies-ponds/streams/river bed/nallaha affecting drainage including farm land and water sources due to sediment or otherwise caused by the construction.	
	3	Materials like fuel, chemicals, cement and bitumen shall be stored in a manner (with impervious layer on bottom and a covered shed on top) that does not contaminate land and ground/surface water.	
XII.	Disposal of Debris and wastes		
	1	Measure to reuse debris & spoils	
	2	Site & method for disposal of remnants approved by EX Engineer	
XIII.	Restoration and Rehabilitation of Sites	Clean up & restoration of sites used for road construction both temporary and permanent be reported. (At completion)	
	1	Work sites	
	2	Plant sites	
	3	Storage sites	
	4	Haul roads	
	5	Labor camp site	
	6	Borrow areas	
	7	Mining site if new mining area opened	
	8	Debris disposal site	
	9	Areas used for traffic diversions	

## Impact Assessment & Compliance on Safeguard Issues

### Multi-Purpose Cyclone Shelters (MPCS)

#### Construction of Road & Bridges under National Cyclone Risk Mitigation Project (NCRMP)-II

#### I. Brief of Multi-Purpose Cyclone Shelters (MPCS) Site

1.	Package No		2.	Village/ Site MPCS	
3.	Taluka		4.	District	
5.	Survey No		6.	Area of Plot (in Sqmt)	
7.	Plot Size & Lay Out in Mt	X			
8.	Name of Contractor				
9.	Labour Camp Address				
10.	Borrow Pit Address				
11.	Category of Land (Pvt./Govt./Forest land)		12.	Type of Land (Ag./Abadi/comm. /waste land )	
13.	Distance of the site from the Habitation (in Mt.)		14.	Land Transferred in the name of NCRMP	
15.	CSMMC Formed		16.	Bank Account Opened	
17.	Total Length of Approach Road of MPCS site (in Mts)		18.	Existing RoW of Approach Road lin Mts.)	
19.	Proposed RoW of Approach Road lin Mts.)		20.	Distance of site from Sea/ water bodies	
21.	Date of Start (DoS)		22.	Date of Completion (DoC)	

#### II. Demographic Profile of MPCS Site

1.	Total Population		2.	Total Female Population	
3.	Total Male Population		4.	Total Children (0-5 years) Age	
5.	Total Population (5-18 years) Age		6.	Total Population Above 60 years Age	
7.	Total Livestock		8.	Milk Produce Animal	
9.	Cattle		10.	Other	

#### III. Connectivity of MPCS Site & Community Property Resources

1.	Name of SH & Distance from MPCS site		2.	Name of NH & Distance from MPCS site	
3.	Distance of the site from Primary Health Centre		4.	Distance of the site from Govt School	
5.	Distance of the site from Community Hall		6.	Distance of the site from Panchayat Ghar	

#### IV. Land Acquisition & Impacts

1.	Existing RoW of approach Road (in Mt.)		2.	Proposed Row of approach Road (in Mt.)	
3.	Total Land Acquisition in Ha. If any (Attach Land acquisition details)		4.	Total Impact on residential / commercial Structure (Titleholders/ Encroachers etc.)	

5.	Total Impact on religious structure		6.	Other Impact (Trees/Crops) etc	
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**V. Temporary Impact during construction period**

Name of Structure					
1.	Length of Structure		2.	Diversion Length (in Mt.)	
3.	Diversion Width (in Mt.)		4.	Diversion Width beyond RoW	
5.	Impact on Land		6.	Contractual with Land Owner	
7.	Category of Contract (Tenancy, Loss of Crop Other Specify)		8.	Compensation paid (Yes/No)	

**VI. Borrow Pit Area**

1.	Government Land/Panchayat Land/Private Land		2.	Borrow Pit Area (in Ha.)	
3.	If Private Land Contractual obligation with Land Owner (Attach the agreement copy)		4.	If Panchayat Land /Government Land NoC taken from Competent Authority	
5.	Rehabilitation of Borrow Pit Area		6.	Contractual obligation with Land Owner for compensation	

**VII. Construction Site Safeguard Information (Monthly)**

1.	Total No of Staff working on site		2.	Total No. of Skilled Staff	
3.	Total No. of Unskilled Staff		4.	Total Labour	
5.	Total Male Staff		6.	Total Female Staff	
7.	Capacity of Labour Camp		8.	Total Labour residing in Camp	
9.	Total Male residing in Camp		10.	Total Female residing in Camp	

**VIII. Compliance on Safeguard issues (Monthly Reporting)**

Sl. No	Particulars of Item	Unit	Quantity	Remarks
<b>A.</b>	<b>Personnel Protective Equipment's (PPEs)</b>			
1	Safety Helmet	Worker/Staff		
2	Safety Jacket	Worker/Staff		
3	Safety Shoes	Worker/Staff		
4	Safety Belt	Worker/Staff		
<b>B.</b>	<b>Facilities at Construction Site</b>			
1	Barricading on site for safety	RMT		
2	Signage & Board for Brief of Project & Utilities	Nos. per site per occurrence		
3	First Aid Box at construction site	Box		
4	Supervisor at Site	Staff		
5	Safety supervisory staff	Staff		
6	Authorized Power Connection	Per day		
7	Light arrangement during night work	Per day		
8.	Toilets & Bathroom for Male (Per 10 Labours)	Toilet		
9.	Toilets & Bathroom for Female (Per 10 Labours)	Toilet		
10.	Guard/Chowkidar	Person		
11.	Sweeper	Person		
<b>C.</b>	<b>Labour Camp</b>			
1	Capacity of Labour Camp	Per Shed		
2	No. of labour residing in camp	Person		
3	No. of Cots	No.		
4	Condition of Roof with heat insulated	Per Shed		
5	Drinking Water	Per Camp		
6	Toilets & Bathroom for Male (Per 10 Labours)	Toilets		
7	Toilets & Bathroom for Female (Per 10 Labours)	Toilets		

VIII. Compliance on Safeguard issues (Monthly Reporting)				
Sl. No	Particulars of Item	Unit	Quantity	Remarks
8	Cleanliness of Toilets & Bathrooms	Toilets		
9	Fire extinguisher	Per Camp		
10.	Crèche as per norms	Per Camp		
11.	First Aid Box at construction site	Box		
<b>D.</b>	<b>Construction Camp</b>			
1	First Aid at construction site	Box		
2	Fire extinguisher	Per Camp		
3	Drinking Water	Per Camp		
4	Soil Contamination due to fuel, lubricant & material	Per Camp		
5	Toilets & Bathroom for Male (Per 10 Labours)	Toilets		
6	Toilets & Bathroom for Female (Per 10 Labours)	Toilets		

IX. Other Activities			
<b>E.</b>	Unauthorized Land Acquisition for allied facilities	Per camp	
<b>F.</b>	Health Check Camp for labour & Staff	Per package / quarter	
<b>G.</b>	HIV/AIDS Awareness Camp at Construction Camp & Labour Camp	Per package / quarter	
<b>H.</b>	Air, Water and Noise Testing	Per package / quarter	
<b>I.</b>	Monthly Safeguard Report as per ESMP	Per Month	
<b>J</b>	Royalty Certificate of sand & Stone metal	Per Bill	
<b>K</b>	Compliance of Insurance as per Contract (Manpower, Vehicle, Machinery & Equipment's etc. )	Duration of Contract	

X. Observation, Comments & Suggestions	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	



## Status of Construction

MPCS.....Package.....Taluk.....District.....

[illegible]

## MPCS.....Package.....Taluk.....District.....

[illegible]

## Construction of Road &amp; Bridges under National Cyclone Risk Mitigation Project (NCRMP)-II

XI. Brief of Road Package					
1.	Package No		2.	Length of Road In Mt.	
3.	Name of Road				
4.	Taluka		5.	District	
6.	Name of Contractor				
7.	Labour Camp Address				
8.	Borrow Pit Address				
9.	Category of Road		10.	No. of Structures	
11.	No. of Cross Drain		12.	No. of Culverts	
13.	No. of Minor Bridges		14.	No. of Major Bridges	
15.	Date of Start (DoS)		15.	Date of Completion (DoC)	

XII. Land Acquisition & Impacts					
1.	Existing RoW of approach Road (in Mt.)		2.	Proposed Row of approach Road (in Mt.)	
3.	Total Land Acquisition in Ha. If any (Attach Land acquisition details)		4.	Total Impact on residential / commercial Structure <b>(Titleholders/ Encroachers etc.)</b>	
5.	Total Impact on religious structure		6.	Other Impact (specify)	

XIII. Temporary Impact during construction period					
<b>1. Name of Structure</b>					
1.	Length of Structure		2.	Diversion Length (in Mt.)	
3.	Diversion Width (in Mt.)		4.	Diversion Width beyond RoW	
5.	Impact on Land		6.	Contractual obligation with Land Owner for compensation	
7.	Category of Contract (Tenancy, Loss of Crop or Other Specify)		8.	Compensation paid (Yes/No)	
<b>2. Name of Structure</b>					
1.	Length of Structure		2.	Diversion Length (in Mt.)	
3.	Diversion Width (in Mt.)		4.	Diversion Width beyond RoW	
5.	Impact on Land		6.	Contractual obligation with Land Owner for compensation	
6.	Category of Contract (Tenancy, Loss of Crop or Other Specify)		7.	Compensation paid	
<b>3. Name of Structure</b>					

1.	Length of Structure		2.	Diversion Length (in Mt.)	
3.	Diversion Width (in Mt.)		4.	Diversion Width beyond RoW	
5.	Impact on Land		6.	Contractual obligation with Land Owner for compensation	
7.	Category of Contract (Tenancy, Loss of Crop or Other Specify)		8.	Compensation paid	
<b>4. Name of Structure</b>					
1.	Length of Structure		2.	Diversion Length (in Mt.)	
3.	Diversion Width (in Mt.)		4.	Diversion Width beyond RoW	
5.	Impact on Land		6.	Contractual obligation with Land Owner for compensation	
7.	Category of Contract (Tenancy, Loss of Crop or Other Specify)		8.	Compensation paid	
<b>5. Name of Structure</b>					
1.	Length of Structure		2.	Diversion Length (in Mt.)	
3.	Diversion Width (in Mt.)		4.	Diversion Width beyond RoW	
5.	Impact on Land		6.	Contractual obligation with Land Owner for compensation	
7.	Category of Contract (Tenancy, Loss of Crop or Other Specify)		8.	Compensation paid	

<b>XIV. Borrow Pit Area</b>					
1.	Government Land/Panchayat Land/Private Land		2.	Borrow Pit Area (in Ha.)	
3.	If Private Land Contractual obligation with Land Owner (Attach the agreement copy)		4.	If Panchayat Land /Government Land NoC taken from Competent Authority	
5.	Rehabilitation of Borrow Pit Area		6.	Contractual obligation with Land Owner for compensation	

<b>XV. Construction Site Safeguard Information (Monthly)</b>					
1.	Total No of Staff working on site		2.	Total No. of Skilled Staff	
3.	Total No. of Unskilled Staff		4.	Total Labour	
5.	Total Male Staff		6.	Total Female Staff	
7.	Capacity of Labour Camp		8.	Total Labour residing in Camp	
9.	Total Male residing in Camp		10.	Total Female residing in Labour Camp	

<b>XVI. Compliance on Safeguard issues (Monthly Reporting)</b>				
Sl. No	Particulars of Item	Unit	Quantity	Remarks
<b>A.</b>	<b>Personnel Protective Equipment's (PPEs)</b>			
1	Safety Helmet	Worker/Staff		
2	Safety Jacket	Worker/Staff		

XVI. Compliance on Safeguard issues (Monthly Reporting)				
Sl. No	Particulars of Item	Unit	Quantity	Remarks
3	Safety Shoes	Worker/Staff		
4	Safety Belt	Worker/Staff		
<b>B.</b>	<b>Facilities at Construction Site</b>			
1	Barricading on site for safety	RMT		
2	Signage & Board for Brief of Project & Utilities	Nos. per site per occurrence		
3	First Aid Box at construction site	Box		
4	Supervisor at Site	Staff		
5	Safety supervisory staff	Staff		
6	Authorized Power Connection	Per day		
7	Light arrangement during night work	Per day		
8.	Toilets & Bathroom for Male (Per 10 Labours)	Toilet		
9.	Toilets & Bathroom for Female (Per 10 Labours)	Toilet		
10.	Guard/Chowkidar	Person		
11.	Sweeper	Person		
<b>C.</b>	<b>Labour Camp</b>			
1	Capacity of Labour Camp	Per Shed		
2	No. of labour residing in camp	Person		
3	No. of Cots	No.		
4	Condition of Roof with heat insulated	Per Shed		
5	Drinking Water	Per Camp		
6	Toilets & Bathroom for Male (Per 10 Labours)	Toilets		
7	Toilets & Bathroom for Female (Per 10 Labours)	Toilets		
8	Cleanliness of Toilets & Bathrooms	Toilets		
9	Fire extinguisher	Per Camp		
10.	Crèche as per norms	Per Camp		
11.	First Aid Box at construction site	Box		
<b>D.</b>	<b>Construction Camp</b>			
1	First Aid at construction site	Box		
2	Fire extinguisher	Per Camp		
3	Drinking Water	Per Camp		
4	Soil Contamination due to fuel, lubricant & material	Per Camp		
5	Toilets & Bathroom for Male (Per 10 Labours)	Toilets		
6	Toilets & Bathroom for Female (Per 10 Labours)	Toilets		

<b>E.</b>	Unauthorized Land Acquisition for allied facilities	Per camp	
<b>F.</b>	Health Check Camp for labour & Staff	Per package / quarter	
<b>G.</b>	HIV/AIDS Awareness Camp at Construction Camp & Labour Camp	Per package / quarter	
<b>H.</b>	Air, Water and Noise Testing	Per package / quarter	
<b>I.</b>	Monthly Safeguard Report as per ESMP	Per Month	
<b>J</b>	Royalty Certificate of sand & Stone metal	Per Bill	

# Chapter 11: Plantation Strategies

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## 11.1 MULTI PURPOSE CYCLONE SHELTERS (MPCS)

MPCS being constructed under NCRMP are preferably located in safer (higher) places generally at one end of village. The MPCS are going to be an important place for succor during natural disaster.

The MPCS built under the project are an asset to the villages. The MPCS are to be used for a set of allowed social purposes as provided in Government of Gujarat resolution number BH KP-10-2016-106-Pu.V.Pu.Ni dated 25<sup>th</sup> May 2016 in normal times. The day-to-day management of the MPCS is assigned to a village committee, as detailed in para 6.3, that has representation of all sections of village community.

## 11.2 CRITERIA FOR SPECIES SELECTION

It is important that the MPCS campus is managed in a manner that meets the desired objective while adding value to it. The trees planted in campus should provide for shade and contribute to aesthetics, food and medicinal value for the villagers. If they could provide for rural recreation that will help address the felt need in the rural infrastructure. The requisite civil works are included in the detailed plan estimate of the MPCS. Trees add value to the MPCS if carefully selected and planted. The criterion for selection of the species for planting is detailed here.

- The species should be deep rooted to withstand high-speed wind.
  - Trees should be able to survive in waterlogged conditions for short periods.
  - Hardy species that grow easily and do not require frequent watering and tending may be preferred.
  - Long living trees may be preferred. However, it may be desirable to plant species that grow fast in between long living trees that may not grow so fast. The short rotation trees may fade by the time the long living trees grow and cover the campus with desired shade. Sometimes it may be necessary to trim branches of these fast growing trees to provide space for growth of long living trees.
  - Trees of fruit bearing species may be preferred if they meet objectives 1 and 2. However, species or varieties needing minimum care are desired. Therefore, if fruit trees are planted they should be of country variety needing minimum care instead of sophisticated tender varieties.
  - Trees providing shade would add to aesthetics and make MPCS a place for recreation to villagers. This will add to frequent use of the MPCS infrastructure and ensure its day-to-day upkeep.
  - The trees in parking area need be so aligned as to facilitate parking and provide shade to vehicles.
  - Trees species with medicinal properties could be added advantage.
  - Preference should be for local species.
  - If the tree species planted could contribute to conservation of bio-diversity that would be added benefit. Variety of species that are getting lost be preferred to contribute to conservation of genetic diversity.
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### 11.3 SPECIES SUGGESTED FOR MPCS CAMPUS PLANTATION

This is a suggestive list which can be mixed with short rotation fast growing species like Kasid, Gulmohor, Pinkesia, Su-baval, etc in small numbers which will add to aesthetics in initial years and may fade in long term.

**Table 11.1 Species suggested for MPCS campus plantation**

Local name	Scientific name
Vad	<i>Ficus benghalensis</i>
Mango (desi variety)	<i>Mangifera indica</i>
Khijdo/sami	<i>Prosopis cineraria</i>
Limdo	<i>Azadirachta indica</i>
Pipado	<i>Ficus tsila</i>
Arjun sadad	<i>Terminalia arjuna</i>
Sharu	<i>Casuarina equisetifolia</i>
Goras amli	<i>Pithecellobium dulce</i>
Khati amli	<i>Tamarindus indica</i>
Amla	<i>Embelica officinalis</i>
Nariyali	<i>Cocus nucifera</i>
Bangali baval	<i>Acacia auriculiformis</i>
Sargavo	<i>Moringa oleiera</i>
Piloo mithijar	<i>Salvadora oleoides</i>
Deshi baval	<i>Acacia nilotica</i>
Gunda	<i>Cordia dichotoma</i>
Bili	<i>Aegle marmelos</i>
Peltophorum	<i>Peltophorum ferrugineum</i>
Gundi	<i>Cordia gharaf</i>
Karanj	<i>Pongamia pinnata</i>

### 11.4 PLANTING DESIGN

The plantation must improve aesthetics and add value. However, care must be taken that trees do not cause damage to building during cyclones by falling on building and obstruct free movement of vehicles. The species selection has accordingly been suggested. The plantation design must also address these concerns. A strip of 10m around the building should be kept clear. So the planting should be beyond 10m from MPCS building. Trees may be planted at 5mx5m distance. The parking should have trees planted in rows facilitating parking of vehicles. In other areas the planting be done in staggered manner. The area around electric line should be planted with small height trees. The region near transformer to a distance of 7 m should be kept clear of any planting.

### 11.5 PLANTING

It is important that plants are planted and tended in initial stages for success. Considering harsh conditions and being in nature of common property it is desired that plants are hardy and grow with minimum care. It would be prudent to use healthy seedlings. Deep pits minimum 45x45x45 cm or more be dug and base filled with farmyard manure or vermi-compost. One-meter high seedling may be optimum. However, this may vary depending on species. Seedlings should preferably be planted in monsoon. This would ensure that tending and watering for two year



may lead to growth of healthy plants that sustain well in future with no further watering or tending requirement.

## **11.6 TENDING**

The tending schedule would include:

### **Year 1**

- a. Three weeding cum soil working during monsoon in first year.
- b. Five watering in year 1 that is between November to June after planting. First being in late November or early December. One watering each in the month from February to May. One additional watering may be needed in June in case rains get delayed.
- c. Soil working after alternate watering will help aeration in soils that have more clay.
- d. Causalities may be planted with fresh seedlings during the year before each watering. It is desirable that about 15% seedlings are reserved during monsoon from the same lot as used for planting. This will help ensure that replacements are of the similar health and age. Thus replacements will not lag behind.

### **Year 2**

- a. Addition of manure as per soil requirement at beginning of monsoon shall help growth reducing tending requirements beyond 2 years of age.
- b. Two weeding cum soil working during monsoon in second year.
- c. Five watering in year 2 that is between November to June after planting. First being in late November or early December. One watering each in the month from February to May. One additional watering may be needed in June in case rains are delayed.
- d. If causalities have been carefully replaced and plantation is well tended it may not be necessary to provide for any more replacements. Only in case of block failure of 10+ seedlings replacements be provided. Filling up of small gap in a healthy growing plantation may not be of much use.
- e. Soil working after alternate watering will help aeration in soils that have more clay.

### **Year 3**

- a. It may be desirable to add manure as per soil requirement at beginning of monsoon to help growth and reduce tending requirements beyond 2 years of age.
- b. More tending requirement may be restricted to areas that were planted in year 2 to fill block failures. The regime may be as for year 2 for such patches.

## **11.7 PROTECTION**

Protection would be key to success. Campus wall with cattle trap and care to keep gate closed should ensure effective protection. In case protection is still not possible effort should be to plant fewer seedlings say 5-10 m apart of big size of long living large sized trees such as Vad, Amla, mango, karanja, limbo etc., with provision of individual tree guards.

## **11.8 ROADS**

Roads are being constructed/widened/strengthened under NCRMP in cyclone prone regions to mitigate impact of natural disaster by providing for quick supplies of food and medicine as also evacuation if required. The roads developed under NCRMP being specifically targeted at mitigating distress during cyclone are located in coastal villages. Floods are common occurrence after cyclone.

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## 11.9 CRITERIA FOR SPECIES SELECTION

The roadside widths available on village roads are narrow providing for planting of few trees. In most of the cases single row planting may only be possible. Thus it will be avenue row only in most of the cases. In few cases two to three row may be possible. The criterion for selection of the species for planting and manner and planting is detailed here.

- The species should be deep rooted to withstand high-speed wind.
- Trees should be able to survive in waterlogged conditions.
- Hardy species that grow easily and do not require frequent watering and tending may be preferred.
- Long living trees may be preferred. However, it may be desirable to plant species with short life that grow fast in between long living trees. The short rotation trees may fade by the time the long living trees grow and cover entire length of avenue. Some times it may be necessary to trim branches of these fast growing trees to provide space for growth of long living trees.
- Trees of fruit bearing species may be preferred if they meet objectives 1 and 2. However, species or varieties needing minimum care are desired. Therefore, if fruit trees are planted they should be of country variety needing minimum care instead of sophisticated tender varieties.
- Trees providing shade would add to aesthetics and make avenue a pleasure to travellers.
- Trees species with medicinal properties could be added advantage.
- Preference should be for local species.
- If the tree species planted could contribute to conservation of bio-diversity that would be added benefit. Variety of species that are getting lost be preferred to contribute to conservation of genetic diversity.

## 11.10 SUGGESTED SPECIES

This is a suggestive list, which can be mixed with short rotation fast growing species like Kasid, Pinkesia, Su-baval, etc in small numbers which will add to aesthetics in initial years and may fade in long term.

**Table 11.2 Species suggested for Roadside Plantation**

Local name	Scientific name
Vad	<i>Ficus benghalensis</i>
Mango (desi variety)	<i>Mangifera indica</i>
Khijdo/sami	<i>Prosopis cineraria</i>
Limdo	<i>Azadirachta indica</i>
Pipado	<i>Ficus tsila</i>
Arjun sadad	<i>Terminalia arjuna</i>
Sharu	<i>Casuarina equisetifolia</i>
Goras amli	<i>Pithecellobium dulce</i>
Khati amli	<i>Tamarindus indica</i>
Amla	<i>Embelica officinalis</i>
Bangali baval	<i>Acacia auriculiformis</i>
Sargavo	<i>Moringa oleiera</i>
Piloo mithijar	<i>Salvadora oleoides</i>
Deshi baval	<i>Acacia nilotica</i>
Gunda	<i>Cordia dichotoma</i>
Bili	<i>Aegle marmelos</i>
Peltophorum	<i>Peltophorum ferrugineum</i>
Rukhad	<i>Adinsonia digitata</i>
Nilgiri	<i>Eucalyptus hybrid</i>

### 11.11 PLANTING DESIGN

The plantation must improve aesthetics and add value. However, care must be taken that trees do not cause obstruction on roads during cyclones thereby obstructing free movement of vehicles and so evacuation and supply of essentials. The species selection has accordingly been suggested. The plantation design must also address these concerns. There are narrow strips along the project roads. In most of the cases the road strip is 12 to 18 m. Road, shoulders and slope occupy more than 70% of the available strip. The available strip for tree planting may be 2 m to 4 m only. As per land availability 1 to 2 row of trees shall be planted. It will be desired that the side with electric line be planted with smaller height trees. Ten meter zone near transformers may kept clear of trees. Seedlings may be planted 4 m apart in rows with a minimum distance of 2.5 m between rows. The distance between rows may be increase to 3m wherever strip width is available.

### 11.12 PLANTING

It is important that plants are planted and tended in initial stages for success. Considering harsh conditions and being in nature of common property it is desired that plants are hardy and grow with minimum care. It would be prudent to use healthy seedlings. One-meter high seedling may be optimum. However, this may vary depending on species. Deep pits minimum 45x45x45 cm or more be dug and base filled with farmyard manure or vermi-compost. Seedlings should preferably be planted in monsoon. This would ensure that tending and watering for two year may lead to growth of healthy plants that sustain well in future with no further watering or tending requirement. The slope of the road bund may be used for raising grass species. Locally occurring species that can withstand refractory conditions of coastal region shall be used. Grass seed mixed with sand shall be sprinkled at onset of monsoon. The grass on bunds shall help stabilize the soil on slopes contributing to stabilization of bund.

### 11.13 TENDING

The tending schedule would include:

#### Year 1

- Three weeding cum soil working during monsoon in first year.
- Five watering in year 1 that is between November to June after planting. First being in late November or early December. One watering each month from February to May. One additional watering may be needed in June in case rains get delayed.
- Soil working after alternate watering will help aeration in soils that have more clay.
- Casualties may be planted with fresh seedlings during the year before each watering. It is desirable that about 15% seedlings are reserved during monsoon from the same lot a used for planting. This will help ensure that replacements are of similar health and age. Thus replacements will not lag behind.

#### Year 2

- Addition of manure as per soil requirement at beginning of monsoon shall help growth thereby reducing tending requirements beyond 2 years of age.
  - Two weeding cum soil working during monsoon in second year.
  - Five watering in year 2 that is between November to June after planting. First being in late November or early December. One watering each in the months from February to May. One additional watering may be needed in June in case rains are delayed.
  - If casualties have been carefully replaced and plantation is well tended it may not be necessary to provide for any more replacements. Only in case of block failure of 10+
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seedlings replacements be provided. Filling up of small may gap in a healthy growing plantation may not be of much use.

- Soil working after alternate watering will help aeration in soils that have more clay.

### **Year 3**

- It may be desirable to add manure as per soil requirement at beginning of monsoon to help growth and reduce tending requirements beyond 2 years of age.
- More tending requirement may be restricted to areas that were planted in year 2 to fill block failures. The regime may be as for year 2 for such patches.

### **11.14 PROTECTION**

Protection would be key to success. In case of single row planting provision of individual tree guards will be required. Where multiple rows are planted barbed wire fencing would be economical.